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Editor:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

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Coal & Steel Community

This month sees the fourth anniversary of the establishment of Europe's first common market—that is, the European Coal and Steel Community's single market in coal and steel throughout the area of the member States. At the moment there enter within its sphere 459 coal pits; 455 iron and steel works, and 188 iron-ore mines. During this period, within the area covered there has been a worthwhile increase in coal production and a really substantial addition to steel production, but the main success has been enormously increased trade across the frontiers within the Community. The Community reports annually to a Common Assembly, which is a 78-member parliament elected by, and from, the legislatures of the member countries. Associated with the Community is a Court of Justice—a tribunal of seven judges, who decide whether the decisions of the Community should be upheld or quashed. The Court's judgments are binding on all parties, be they Governments or the Authority itself. Finally, there is a Council of Ministers representing the original six member States; this harmonizes all the national policies with that of the Community and is consulted by the Community before taking major decisions. The British Government, since December, 1954, has been closely associated with the Community.

The object in setting out here in some detail the operation of the Community, is that it may disclose a "blueprint" of the set-up for the proposed European free-trade area. That the Community has had "teething" troubles is well known, but that they have been overcome is encouraging for the future. The fact that much attention is being given to social aspects of industry is significant, for legislation governing these often—though not always—increases manufacturing costs. If nations are to be associated in a community, then parallel socio-working conditions should be established. Standardization of "factory acts" throughout Europe would, we believe, reduce accidents and make for fairer trading conditions.

The power vested in the Community to dissolve cartels and to resettle redundant labour is important. Under the latter authority an attempt was made to move 5,000 miners from the diminishing coalfields of southern France to the expanding Lorraine mines. It was not an outstanding success, as only 650 accepted the invitation despite the lure of a £200 bonus, guaranteed housing, and free travel and removal. Schemes for retraining and resettlement of Italian miners and steel workers seem to have been more successful. Another subject on which the Community has been active is on the issue of a European labour card, through which skilled workers will be able to obtain employment within the area controlled by the Community, free from all restrictions. All this makes one wonder what will be the final outcome of the European free-trade zone, and whether its development will produce similar activities but on a much wider scale.

Death of Mr. Lennox Holt

It is with deep regret that we announce the death of our esteemed colleague, Mr. Lennox Holt, who died last Monday in Guy's Hospital at the age of 55. After training at an agricultural college, he forsook the countryside to become advertisement representative for this JOURNAL; this was in the year 1926. In those days, it was customary for the makers of foundry equipment and supplies to place advertisements direct and so Lennox, as he was universally known, not merely became acquainted with the principals of these concerns but attracted their friendship and esteem. During these 30 years, he saw the JOURNAL increase its business enormously, and much of this growth was due to his efforts. He never lost his love for the country and at some personal inconvenience, chose to live around the Surrey/Sussex border. After the last war, the nature of the advertising business changed and more frequently he had to meet the agents, where again he made a wide circle of friends. He joined the IBF in 1930 and was a regular and popular participant in the annual conferences. He had a profound knowledge of the foundry industry, and being a patient listener, absorbed sufficient of its technology to take an intelligent interest in all new developments. Lennox was married and had one daughter, and to them will go our condolences, those of advertisers and a host of his friends amongst foundry executives, where his jovial yet modest character will long be missed.

Canadian Steel Output Peak

Output of steel and pig-iron in Canada continues to increase, and new peaks were established in January. The month's output of steel ingots totalled 450,886 tons and was 6 per cent. above the January, 1956, figure. Pig-iron production, at 305,362 tons, showed an advance of 7 per cent.

Dinner

FOUNDRY COKE MERCHANTS' ASSOCIATION

A record attendance of 260 members and guests assembled at the May Fair Hotel, London, last Thursday for the annual banquet of the Foundry Coke Merchants' Association. At the high table, the chairman, Mr. Edwin Tasker (Darby & Company (Birmingham), Limited), was accompanied by the chief guest, Mr. R. H. E. Thomas, O.B.E. (member of the National Coal Board); Mr. N. P. Newman, J.P. (chairman, Council of Ironfoundry Associations); Mr. H. J. V. Williams (president, Institute of British Foundrymen); Mr. Leslie O'Connor, C.B.E.; Mr. J. Y. Feggetter; Mr. R. J. McDonald (deputy chairman of the Association); Mr. V. E. Upton; Mr. C. F. Sullivan; Mr. E. W. Pugh; Mr. H. H. Prosser; Mr. W. Armstrong; Mr. R. H. Thornley, and Mr. W. Thomas, F.R.I.C. The toast of "The Guests" was proposed by the chairman who, concluding his remarks, mentioned a few unavoidable absences at this year's function—among them Mr. Arnold Carr (who is in Australia); Mr. Barrington Hooper, C.B.E., and Mr. J. J. Sheehan, B.SC., A.R.C.SC.—and Mr. R. H. E. Thomas and Mr. Newman responded, the former saying, *inter alia*, that as a result of the Restrictive Practices Act new arrangements were foreshadowed between the NCB and the merchants. Mr. Feggetter, who proposed the toast of "The Association," mentioned the growth of the founding industry since 1939 (putting the increase at nearly 60 per cent.) and said that, despite some sectional recession, the total production in 1956 was expected to be very similar to that of the previous year. After a short break, the proceedings continued with light entertainment, the organization of the whole function being carried through admirably by Mr. McDonald.

BR Exhibition of Brake Components

In connection with the Railway Modernization Plan and the wide range of components necessary for the programme, British Transport Commission has arranged (as announced in the JOURNAL, February 7, p. 182) an exhibition of vacuum-brake equipment This is currently being held at Room 156, Euston Station, London, N.W.1. Not many castings are on show, but a valve component—the heart of the whole brake mechanism—embodies two grey-iron castings to B.S. 1452, grade 12, and several others in gunmetal to B.S. 1400 specifications. No fewer than 59,500 of this latter component will be required. There are also required 32,000 dummy couplings to be made as die-castings to comply with B.S. 1490L. The exhibition, arranged solely for trade representatives, is to remain open until March 1.

The ingot-mould casting shown in the illustration was made at the Vitkovice "Klement Gottwald" ironworks in Czechoslovakia for the Kuncice New Foundries—Czech plant comprising integrated blast-furnaces, coke-ovens, smelting shops and rolling mills which is at present being extensively modernized and enlarged. In the the picture, two welders—one of them a woman, reported to be the first woman to gain a State certificate for welding in Czechoslovakia—are working on the inside surface of the mould.

Automatic "Buehrer" Moulding and Pouring Plant in the Malleable-iron Foundry of George Fischer, Limited

Basic Principles and Practice at Pilot Plant in Schaffhausen (Switzerland).

George Fischer, Limited, of Schaffhausen, have installed in their malleable-iron foundry what is claimed to be the first automatic moulding and pouring plant. The design of the complete installation entailed extensive basic research and study of foundry technique, in addition to consideration of the inherent requirements of the average European foundry, i.e.—small orders with relatively large pattern costs, close dimensional tolerances, a great variety of shapes and sizes and fluctuating production demands. The plant, although of working dimensions, is still regarded as a pilot plant and a further installation is in course of construction at Schaffhausen embodying the principles described in the abstract which follows:

Preparing the Mould

Clay-bonded sand was chosen as being the material best suited to the method of casting being considered and for the type of production envisaged. A mould of clay-bonded sand is ready for use immediately after ramming and does not require time for hardening, as does organically-bonded sand. On the other hand, on account of greater internal friction, clay-bonded sand is more difficult to compact evenly; this is very much dependent upon the manner in which the compaction forces are applied and much initial research work was required to find out the most suitable method to apply so as to ensure fully-automatic operation of a foundry.

Figs. 1 and 2 explain the effect of mere compression—a cone of loose clay-bonded and moist prepared moulding sand shows practically no movement transverse to the direction of compression even if the compression pressure is abnormally high. The slight enlargement of the cone base from 12 to 12⅛ in., shown in the illustration, is a consequence of slipping movements of the sand at the beginning of the experiment and is not caused by the compression effect. In order to achieve uniform compaction of sand above a patternplate, the sand would have to lie equally loose and equally high above each part of the pattern before compaction began; this is, however, not possible to arrange on account of the varying height of the pattern. In addition, the compacting effect, of pressure alone, changes considerably in the direction of the pressure: it decreases rapidly from the sand layer nearest to the pressure plate and also decreases with increasing depth or height of the moulding box, as is shown in Fig. 2.

The feeding of sand into a moulding box and the shape of the sand mass above the edge of a box before compaction play a most important part in proper ramming. Hitherto, in order to achieve an evenly rammed mould on existing moulding machines, it has been necessary for the machine operator to feed in sand by hand while filling of the box was in progress. The new method and plant permit complete automation of the moulding operation, thus eliminating all additional manual work. Size and weight of the mould are no longer dependent on the moulder's physique, therefore moulding boxes of considerably greater dimensions than have so far been customary in machine moulding of small castings can be chosen. The standard size at the Schaffhausen works is 26 by 21 in., but there are three different heights—7½, 10 and 12 in.

Sand Choice and Application

As regards sand qualities, it was decided to work with facing sand and backing sand. The mechanical and thermal conditions existing in the layer of sand next to a pattern and runners demand good-quality sand, certainly much better than that necessary for the deeper layer filling the box. If standard unit sand had been chosen, it would have meant using high-quality facing sand only and the process would have become too expensive. Apart from the question of using facing sand or standard sand, it was decided that the required surface finish of the castings would, in any case, make it necessary to cover the patterns with a finely distributed sand layer first, that is, to start the box filling operation by sieving sand into it.

In the operation of the pilot plant erected at Schaffhausen, the manipulation of the sand into the box prior to ramming begins as soon as two small hoppers above the moulding machine have been filled (one with facing sand and the other with backing sand), by means of conveyor belts from the main container under the mixing machine. The machine hoppers are small and only hold sufficient for four or five box-halves. The sand is sifted before it falls into the small hoppers, so that there is no pre-pressing, and it lies in loose storage ready for use. The bottom of the facing-sand hopper is made in the form of a grid, which can be vibrated vertically. When at rest no sand can flow, because it forms bridges across the grid apertures. When the vibrating mechanism is switched on, the restraining forces which cause these bridges to form are

* Abstracted by Dr. O. P. Einerl from a paper read by W. Götz at the International Foundry Congress, Düsseldorf.

destroyed and the sand flows freely in fine streams over the patterns. As the size of the hopper grid is the same as the moulding box, the whole pattern surface is evenly covered with a layer of fine sand. The quantity of sand sifted into the box is controlled by the duration of vibration and is regulated to suit the requirements of the patterns.

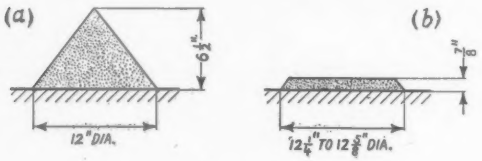


FIG. 1.—(*a*) *Cone of loose sand before compression and* (*b*) *the same sand after the application of* 80 *tons pressure.*

Backing Sand

The backing sand is transferred from the appropriate hopper above the machine by means of a special "filling container" mounted on bearings which permit it to be swung round under the hopper or located accurately over the moulding box to which it is automatically clamped for the first stage of compaction. It has the same internal dimensions as the moulding box and when clamped in position is virtually an extension of it. The bottom of this "filling container" consists of two sliding shear plates which are inclined towards the middle, the angle of inclination being adjustable over a small range. The chute of the backing-sand hopper is of special shape and fits with little clearance into the filling container, the quantity of sand being determined by the depth to which the chute is allowed to pass into it. When the doors of the chute are opened, sand pours freely through the smallest possible height to form a continuous column of sand from the container into the chute. The combined effect of the inclined bottom of the container and closing the chute doors through the sand column, leaves the sand heaped up at the sides and corners and low in the middle; (see Fig. 3 (*a*)).

When the filling container with its load of backing sand has been located and clamped to the mould, the hinged plates open, altering their angle of inclination only slightly, enabling the sand to fall from the least possible height into the moulding box. The volume of the loosely packed sand is sufficient to fill not only the moulding box but half the container also, and this ensures equal sand density over the whole area (Fig. 3 (*b*)). The sand is then ready for the first compaction operation and is as well distributed (but in much less time) as if it had been put in by hand by a moulding-machine operator.

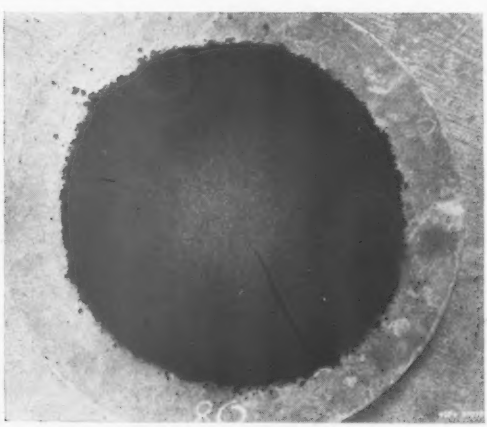


FIG. 2.—*Photograph of the sand cone shown in Fig.* 1 (*b*), i.e., *after the application of* 80 *tons pressure. It can be seen in the light central section that the clay has separated from the silica grain which itself is not split up.*

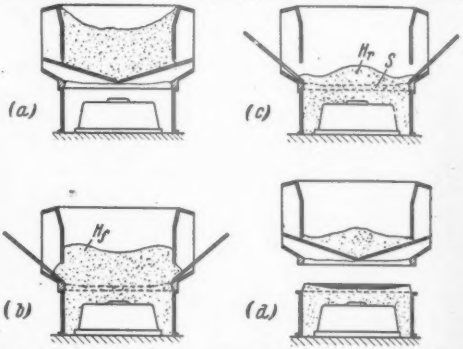


FIG. 3 (*a*) (*b*) (*c*) AND (*d*).—*Backing-sand container and stages in the operation of filling a moulding box;* (*a*) *container as loaded with a measured amount of sand from the chute of the backing-sand hopper;* (*b*) *hinged plate opened for sand to enter the moulding box;* (*c*) *assembly after preliminary compaction by jolting, and* (*d*) *excess sand removed and mould ready for squeezing.*

Compaction

The first stage of compaction is done by jolting, with the container still on the moulding box, and this reduces the height of the sand from Hf (height as filled) to the reduced height (Hr), as shown in Fig. 3 (*c*). A few powerful, heavily damped blows achieve a condition which closely approaches the desired final compaction. The sliding plates are closed at this stage, shearing off the small amount of surplus sand but leaving sufficient standing above the edges and corners of the box for the final compaction. Fig. 3 (*d*) shows the situation immediately after the filling container has been

lifted off the moulding box, with the sand bed ready for final pressing. If greater sand densities should be required along the moulding box walls and in the corners, the shearing off of the sand can be automatically altered to produce a mould suitable for final pressing. Fig. 3 (*e*) shows an example in which the extra sand around the box walls can be clearly seen. By these measures, the mould hardness near the pattern surfaces in the middle of the box and that near the box walls can be substantially equalized.

The pressure plate used for the final compaction is fitted with a series of ribs which form small channels in the sand, to facilitate the flow of gases under the weights applied during pouring, also, a spring-loaded frame around its periphery prevents sand being blown out if the press is closed too quickly. The surface of the sand after pressing is left a little above the box walls.

FIG. 3 (*e*).—*Mould-half before squeezing, showing the extra sand at the edges left after the operations shown in Fig.* 3 (*a*) *to* (*d*).

Lifting-off the Moulding Box

A new type of mould gripping and stripping device applied in the new plant prevents the moulding box from tilting during the stripping operation, so that a minimum of damage to the mould is assured. This device necessitated the construction of a new type of moulding box. This is of welded steel plate, fitted with cast-steel lugs for the location pins and pneumatic clamps. The walls are hollow and the inner shell is perforated to permit the escape of gases. The clamping dogs of the lifting apparatus operate in the horizontal plane and grip each end of the steel lugs referred to earlier, thus avoiding any tendency to bend the walls of the box. Reference to Figs. 4 and 5 should make these features clear. The lifting action is accompanied by vibration, the lifted box-half being swung clear of the moulding machine by a rotary movement of the gripping and lifting device and, in the case of the bottom half, turned over also and placed on the conveyor belt.

FIG. 4.—*Special welded-steel box-part used in the Schaffhausen automatic moulding plant.*

Assembling the Patternplate

As mentioned in the introduction, the aim in designing the automatic plant was to cater for small orders of medium- or small-size castings. It has always been the practice for repetition work in small numbers to make only one or two patterns and to mould from these by using split patterns screwed to a machine plate, or by making plaster or stone patterns from several patterns suitably arranged for machine moulding.

Fig. 6 shows a standard patternplate, to suit moulding boxes 26 by 21 in., which can be subdivided into half, quarter, eighth or sixteenth plates, all of which are interchangeable and held by a special clamping frame. In this way, plaster patterns can be used along with smaller wooden or metal patterns up to a maximum height of 8 in., the smaller patterns being supported by machined packing pieces to bring the parting line of all to the same level. If desired, heating plates (Fig. 6 (*c*)) and intermediate frames for raising patterns to the required level (Fig. 6 (*d*)), can be bolted in. A special advantage of this method of assembly is the ease with which individual sectional patternplates can be changed.

Transfer to Conveyor and Closing

The delicate operations of transferring moulds to the conveyor and closing, when carried out fully automatically, require precise locations and secure

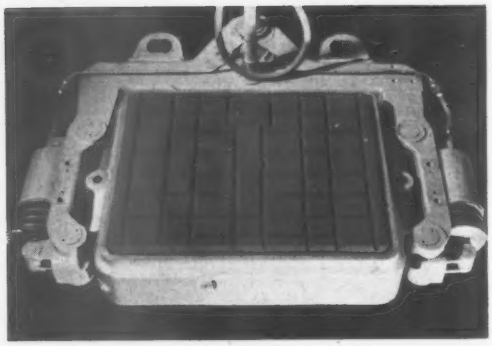


FIG. 5.—*Pneumatic clamping, lifting and turnover arrangement applied to a completed half mould.*

clamping. It is essential that the parting line of the lower box-half be truly horizontal, so that the upper half will settle into place without interference. For this to happen, the pressed sand surface must be parallel to the parting line. To ensure this condition, a skimming knife is located on a roller track which carries the lower box-half from the lifting-off apparatus to the device which turns it over, so that the sand surface is skimmed whilst the box is supported on its walls at the parting line. The maximum heights for lifting and closing standard moulding-box halves, or any part of the mould or covered cores above the parting line, are: top 4 in., and bottom 10 in.

Casting Operation

"Automation" of the pouring process created new problems. The size of the standard moulding box (26 by 21 in.) is far in excess of the usual dimensions for small castings. On account of the many different patterns assembled on the sub-divided patternplate, the use of a common gating system fed by a common pouring basin must be excluded. The unequal length of the channels necessary to carry the liquid metal would result in varying degrees of cooling and the gating system would have to be very bulky, which would cause stresses in the castings. It would also prevent economic use of the box-space available for the smaller single patternplates; in addition, it would be nearly impossible to re-connect with the common running system if one of the individual patternplates were to be changed.

If, on the other hand, an attempt to provide such a large-area moulding box with separate runner basins for the different patterns or groups of patterns were made, it would certainly be possible that mould gases would penetrate into empty moulds, where they would explode and cause damage to the mould. It would also be possible that some of the pouring basins would be so far from the edge of the box that the pouring ladle would have to be taken very high, thus pouring with a very long stream of liquid metal, which would make it practically impossible to keep the pouring basin and runner constantly full. Conditions for the correct pouring of small and medium-sized castings have been clarified by experiments carried out by Swift, Jackson and Eastwood.*

The solution of the problem for the Swiss plant was found in the creation of a particular system of channels, by means of which the pouring basin is connected with the ingates of the sectional patternplates; (see Fig. 7). The volume of this channel system is considerably larger than any conventional gating systems, when compared with the volume of metal required for the castings. If these channels were filled as well as the moulds, there would obviously be considerable waste of metal, but the occurrence is avoided by weighing out the required amount of metal into the pouring ladle. The quantity is made just sufficient to fill the ingates up to the level of the bottom of the channels after the moulds are full. In practice a certain amount of metal solidifies on the bottom of the channels but, contrary to expectation, it proved to be so small in comparison with the usual weight of runners on single castings, that a marked improvement in yield is achieved.

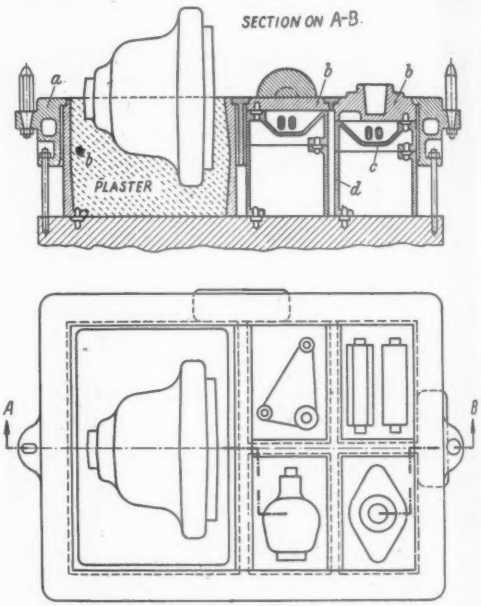


FIG. 6.—*Section and plan views of a standard multiple patternplate, showing how half and one-eighth sections can be divided off and portions built up when necessary. The main frame is shown at (a) sectional plates at (b) heating elements at (c) and distance pieces at (d).*

* *Trans.* AFS, 57 (1949), 77-88.

The intentional large-capacity of the channel system enables it to serve also as the pouring basin; and as the pouring ladle receives only the exact amount of metal required for one mould, it is possible to pour with extraordinary speed. The molten metal is accurately weighed into the pouring ladle from a stopper ladle controlled by a weighing machine. The emptying of the pouring ladle is practically independent of the time that is

FIG. 7.—*Completed mould, with pouring-basin and ingate-channel system—connected to several mould impressions—incorporated in its upper face.*

taken to fill the various runners and the metal is poured into the channel system more rapidly than the runners can carry it away. This creates a condition of bottom pouring which, in itself, is a safeguard against inclusion of slag, air or metal oxides, in addition to which pouring takes place from the best possible position, just over the edge of the moulding box. In order to damp the impact of the liquid metal on the rammed sand in the box, a cored grid is inserted through which the metal is poured (Fig. 7). Just below the grid is a rib, also produced as an inserted core, which stands in the way of metal flow and divides it. The fact that the correct quantity of metal is poured into each mould assures a most economic operation of the plant. Several ladles have to be used, each of these can fill up to one hundred moulds per hour, an arrangement which requires only one man for general supervision. His main duty is to adjust the automatic weighing machine as soon as the casting weight of a box is altered after one, or several pattern sections have been changed.

Moulding the Channel System

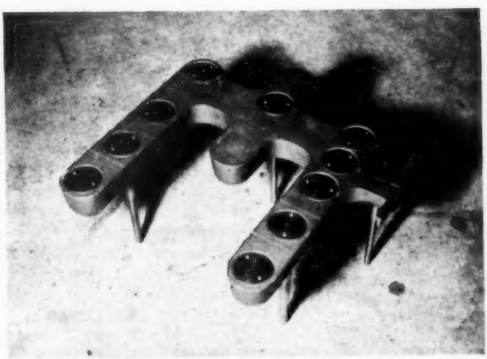
The channel system is moulded from a pattern simultaneously with the ramming of the top part of the moulding box. As the runners taper downwards, the patterns for these are withdrawn upwards and may therefore be attached to the pattern for the channels. Investigations into the runner positions which would be required for all the various combinations of patterns met with in practice showed that they could be confined to a few axes. By providing the channel patterns with interchangeable positions for the runner patterns, it is possible to make one of them serve for a large number of patternplate assemblies, thus limiting the number of patterns for channels very considerably. Fig. 8 shows as an example the channel pattern, with the interchangeable runner positions, which was used for the mould shown in Fig. 7. The usual depth of the channels is 2½ in., so that the top part of the moulding box must be high enough to provide for this without the risk of damage to the sand covering the patterns in it.

Automatic Weighting

Past experience of mechanized foundries handling moulds on conveyor belts has shown that the incorrect loading and unloading of the weights is very often the cause of scrap and otherwise inferior castings. The new plant was therefore equipped with shock-free loading and unloading of weights on the moulds, using ceramic weights which are brought along by means of two link chains, one on each side of the conveyor. These ceramic weights are made of a material with good thermal conductivity and having little tendency to warp under the conditions of uneven heating and cooling, such as is experienced with metal weights. Should the ceramic weights prove inadequate for a particular job, additional metal weights can be added.

The link chains carrying the weights are arranged to incline downwards towards the conveyor, so as to deposit the weight, before passing downwards under the floor. They then proceed horizontally to the end of the pouring station, move up at an incline and remove the weights from the cast moulds. From there, the laden chains travel back—sufficiently high above the floor—to the starting point. The speed of the chains is so adjusted that the horizontal component of travel agrees exactly with the speed of the conveyor.

FIG. 8.—*Example of a channel pattern such as is used to form the gating system shown in Fig. 7.*



"Buehrer" Moulding and Pouring Plant

Given a suitable spacing for the weights, they are thus deposited smoothly on to the mould box, always in the same position and without being influenced by the height of the box. If no mould arrives, they are deposited on the pallet conveyor.

Cooling and Knocking Out

Each casting requires a minimum cooling time, sufficient for it to solidify and become firm enough to be separated from the mould without damage. The factors which influence this time, apart from the material specification itself, are:—first, the wall thickness of the casting or, more accurately, the ratio of surface-area to volume; the gating technique; the position; number and size of risers, and also the casting temperature. Important, also, is the circumference of the sand masses present as cores, and last, but not least, the ratio of sand to cast-metal in a mould. Very often thermal stresses caused by gating techniques make it necessary to knock out a casting while it is still very hot, in order to remove restraining runners and risers. This is very often necessary in the case of malleable iron with its brittle as-cast structure.

In order to provide for various cooling times dictated by the circumstances quoted, separate cooling tracks have been designed on to which the moulds can be directed according to their individual requirements—short, medium or long. The time on the short track is adjustable between six and ten minutes and is suitable for thin-walled castings; on the next track six to 12 minutes and on the third six to 16 minutes are allowed. For special purposes, a fourth track is available which allows a cooling time of up to 25 minutes.

Knocking out of the boxes takes place on a specially designed vibrator without damage to them and they are then returned to the moulding machine. The pallet conveyor used for this purpose is not the usual horizontal loop; the forward and return tracks are situated one above the other and the pallets are transferred from one to the other by means of a special device.

The clay-bonded moulding sands which are knocked out from the moulds can be fully, or almost fully, reclaimed for further moulding. This is possible because a considerable proportion of bonding clay and active coal-dust still remains in the sands, also because only a very small proportion of the highly refractory silica grain is destroyed by slagging or splitting.

Whereas it is easy to replace lost moisture or binder, the problem of cooling the return sand still remains a major problem. The method adopted in the Schaffhausen plant consists of utilizing a perforated belt conveyor which is loaded with a shallow layer of sand, which passes through and forms the base of a cooling chamber. The cooling chamber is made reasonably airtight by means of special end doors for the conveyor belt and the pressure inside is reduced below atmospheric, thus forcing cooling air to pass through the sand from below.

Pneumoconiosis on Television

On Thursday, February 14, "Members' Mail" an independent television programme introduced, to the homes of many UK viewers, a discussion on pneumoconiosis—the pulmonary disease which for a number of years has been the concern of foundrymen and miners alike. With the advent of mass-production foundry techniques the disease has attained more serious proportions, previously it was confined mainly to sand-blast operators ("Sand" since having been eliminated).

In general, the programme was well and fairly presented, though it gave a rather gloomy picture of the foundry industry to the general public*, who must have come to the conclusion that foundry managements and government departments were practically ignoring, or shirking responsibilities in relation to the disease. The programme, which opened with a typical foundry scene, was introduced by Mr. John Dugdale, M.P. for West Bromwich; he stated that although the general public were ignorant of this problem, the foundryman, miner, and pottery worker, viewed the matter with increasing alarm. Foundrymen who were interviewed during the programme, had either had the disease themselves or knew of many who suffered; they all made the point that, in their opinion, if the Iron and Steel Foundry Regulations of 1953 (the final clauses of which came into operation on January 1, 1956) were fully implemented and observed the disease would in the future cease to have major significance. On becoming affected, it was said that the only recourse open to a sufferer from the disease was to take action by common law†. A works doctor stated that if old-fashioned prejudices and ignorance could be overcome, resulting in 100 per cent. attendance for X-ray examination, the medical profession would be half way towards solving the problem. At this point the disease was dramatically illustrated by means of two X-ray pictures, one of a normal healthy lung-structure, the other of the lungs of an affected man who had died three years later.

The employers, who put their cases impartially, agreed that it was essential to have dust-extraction plant in operation, and advisable to have X-ray equipment available; however, the controlling factor in a small company was capital. One director stated that his company had recently installed an extraction plant at a cost of £17,000.

* The writer viewed this programme with six people who had no connection with the foundry industry, in order that an unbiased opinion on the programme could be obtained.

† Information on numerous law cases based on claims referring to pneumoconiosis have been published by the FOUNDRY TRADE JOURNAL; the most recent of these appeared February 7, 1957, p. 181.

South African Exhibition—Models Wanted

The South African branch of the Institute of British Foundrymen is to celebrate its coming of age next year. In this connection, there is to be held a foundry exhibition in Johannesburg, where the entrance hall to the public library has been booked for a three-week period. Owing to restrictions on space and other considerations, exhibits will be confined to showing historical development and present-day practices in foundrywork—mainly for the general public—through the medium of showcases containing models, etc. Thus the organizers are appealing to readers of the FOUNDRY TRADE JOURNAL to lend models for display, including castings or assemblies of castings. Information as to size, type and availability should first be sent to Mr. John Steele, P.O. Box 346, Kempton Park, Transvaal South Africa.

Fatigue of Cast Iron*

By H. Morrogh

(*Continued from page 202*)

In this concluding section of the review, the Author deals with the effect of surface rolling, experimental evidence for both flake-graphite and nodular-graphite material is quoted and paragraphs on the effect of elevated and low temperatures, surface finish and annealing complete this most comprehensive survey.

Effect of Surface Rolling on the Fatigue Properties of Nodular and Flake-graphite Cast Irons

Recent work by Gilbert and Palmer[23, 24] has shown that the fatigue properties of flake and nodular cast irons can also be improved by surface rolling. A practical application of surface rolling has been demonstrated by Love[25] who, by cold rolling the fillets of a cast crankshaft, improved the fatigue strength by 60 per cent. The work by Gilbert and Palmer has been carried out on ferritic and pearlitic flake and nodular irons. It has been shown that the fatigue life at stresses above the fatigue limit, as well as the fatigue limit itself, can be increased by surface rolling. The increase in fatigue limit is greatest in ferritic materials and nodular irons are better in this respect than flake irons. There appears to be a rolling pressure at which optimum fatigue properties are obtained and which varies in different materials. Above this pressure, the fatigue properties deteriorate due to surface damage. Increases in fatigue limit greater than 190 per cent. have been obtained by rolling ferritic nodular irons.

The beneficial effect of surface rolling on the fatigue properties can be attributed to two factors: (*a*) work hardening of the surface material, and (*b*) the inducement of compressive stresses at the surface as a consequence of the deformation. The fatigue limit is increased due to work-hardening because this phenomenon increases the tensile strength of the material. A compressive stress at the surface increases the fatigue limit because the compressive stress superimposed on the applied tensile stress increases the tensile load required to produce fatigue failure. In other words, the specimen has to be loaded in tensile sufficiently to overcome the compressive stress before an additional tensile stress to cause fatigue failure can be applied. A compressive stress is induced in the surface layers in the following way: When a material is surface rolled, the surface will be permanently deformed while the central core of the material will only be elastically deformed. After rolling however, the layers beneath the surface are prevented from returning to their original length by the surface layers which have an increased unstressed length due to the permanent deformation. This creates a tensile stress in the central core which is balanced by a compressive stress in the surface layers.

It appears from the results obtained that the greatest increase in fatigue limit due to rolling is obtained from a material which, due to its ductility, can withstand the greatest amount of cold work without developing surface damage. In such a specimen the work-hardening and the induced compressive stresses will be greatest.

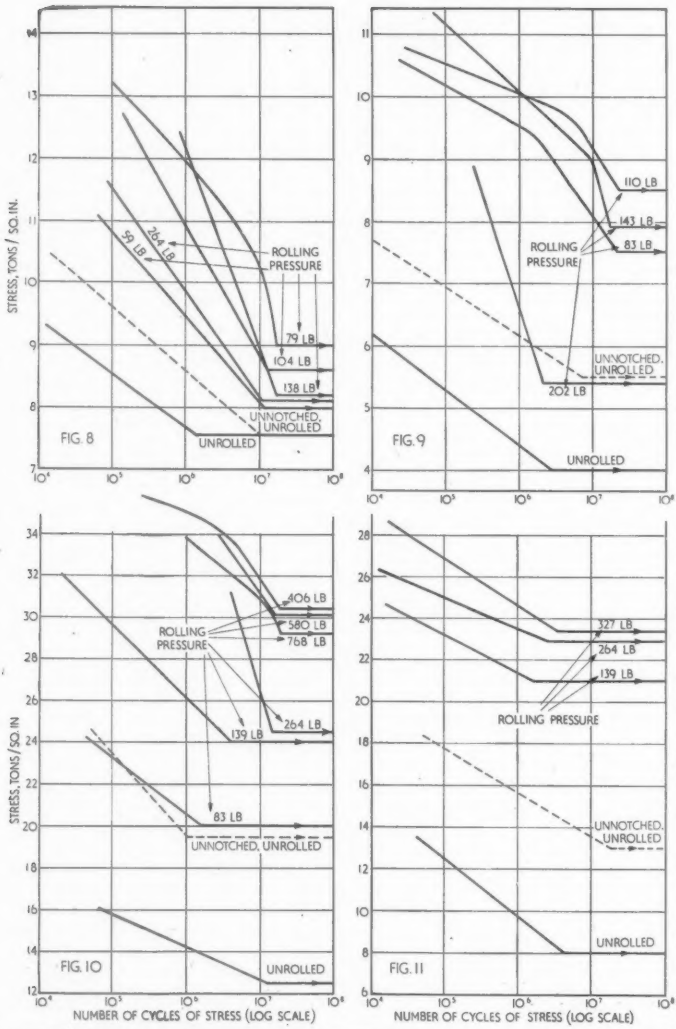
Experimental Details

The mechanical properties of the irons tested by Gilbert and Palmer are shown in Table V. The surface rolling was carried out on V-notched specimens rotated between three hardened-steel rollers held in a framework and the pressure was applied by tightening a spring. The radius at the tip of each roller corresponded with that of the notch in the fatigue specimen. To ensure that rolling was confined to the root of the notch, the angle of the rollers was 5 deg. less than the notch. Rolling was carried out by rotating the fatigue specimen slowly in a lathe while the pressure was applied. After rotating a few times at the appropriate pressure, the load was removed and the apparatus taken from the specimen. A fatigue test was then carried out in the normal way. Rolling pressures up to 765 lb. were used and in a number of cases they were sufficient to reduce appreciably the original notch

* Extracted from a chapter of the book "Fatigue of Metals," edited by Professor J. A. Pope, shortly to be published by Chapman & Hall. The Author is research manager, British Cast Iron Research Association.

TABLE V.—*Mechanical Properties of Test-pieces Used for Fatigue Testing in Relation to the Effect of Surface Rolling.*

Iron.	Type.	Limit of proportionality, tons per sq. in.	0.05 per cent. proof stress, tons per sq. in.	Ultimate tensile stress, tons per sq. in.	Elongation per cent.	Modulus of elasticity × 10^6, lb. per sq. in.	BHN 3,000/10.
1	Pearlitic flake ..	—	—	16.7	—	—	201
2	Ferritic, flake ..	—	—	9.8	2	—	99.4
3	earlitic, nodular ..	13.1	23.3	45.3	3	25.9	251
4	Ferritic, nodular ..	11.6	15.8	27.5	30	25.5	133



FIGS. 8 TO 11.—*Effect of surface rolling on the fatigue stress; Fig. 8 for pearlitic flake-graphite iron; Fig. 9 for ferritic flake-graphite iron; Fig. 10 for pearlitic nodular iron, and Fig. 11 for ferritic nodular iron. (Gilbert and Palmer.)*

diameter of the specimen. Account was taken of these changes in diameter when calculating the fatigue stresses.

Results

Fig. 8 shows the effect of surface rolling on the fatigue properties of a pearlitic flake-graphite iron. Optimum fatigue properties were obtained at a relatively low pressure of 79 lb. and the fatigue limit increased only 20 per cent. At higher pressures the fatigue limit decreased. Due to rolling, the "knee" of the fatigue curve moved to higher stress-cycle values, so that the fatigue life at stresses above the fatigue limit was increased.

Fig. 9 shows a set of curves for a ferritic flake-graphite cast iron. This material had 2 per cent. elongation in the tensile test and consequently a greater capacity than the pearlitic flake-graphite iron for absorbing cold work without developing surface damage. The optimum fatigue properties of this material developed at a higher rolling pressure of 110 lb. and the increase in the fatigue limit was 111 per cent. At rolling pressures close to that for optimum fatigue properties, the "knee" of the fatigue curve was moved to higher stress-cycle values and the slope of the curve at stresses close to the fatigue limit was increased.

Fig. 10 shows the fatigue curves for the pearlitic nodular iron. This material had greater ductility than the flake-graphite irons and therefore a greater capacity for absorbing cold work. Because of its relatively high strength and increased ductility, optimum fatigue properties were developed at a higher rolling pressure of 406 lb. and the fatigue limit was increased 143 per cent. Again the "knee" of the fatigue curve moved to higher stress cycle values and the slope of the curve increased at rolling pressures close to those for optimum fatigue properties.

Fig. 11 shows the fatigue curves for the ferritic nodular iron. This material had 30 per cent. elongation in the tensile test and therefore the capacity to absorb a relatively large amount of cold work without developing surface damage. Because of this, the nodular material showed the greatest increase in fatigue limit—193 per cent. This occurred at a lower rolling pressure than with pearlitic nodular iron because the tensile strength was relatively low.

Mean Stress and Stress Range

For grey cast irons, Moore, Lyon and Inglis[7] found a progressive increase in safe-stress range with increasing mean compressive stress, whereas Seeger[26] found a decrease in safe-stress range after

exceeding a compressive stress of about 12.5 tons per sq. in., as shown in Fig. 12. To resolve this difference, Hempel and his co-workers carried out many tension/compression fatigue tests on various malleable and grey cast irons with various mean compressive stresses leading to pulsating compressive stresses. Fig. 13 gives a typical set of results obtained by Hempel for an iron having a tensile strength of 15.3 tons per sq. in. and a compressive strength of 57.3 tons per sq. in.; similar results were obtained with other irons. With increasing compressive stress up to about 22 tons per sq. in. there is a progressive increase in the safe-stress range. Beyond this stress there is an increase in the specimen section after test and a decrease in the safe-stress range.

With malleable cast irons a somewhat different diagram was obtained, as shown in Fig. 14. The ratio of the strength under repeated load for compression, to that for tension gave an average value of 3.3 for all types of grey iron and only 1.5 for

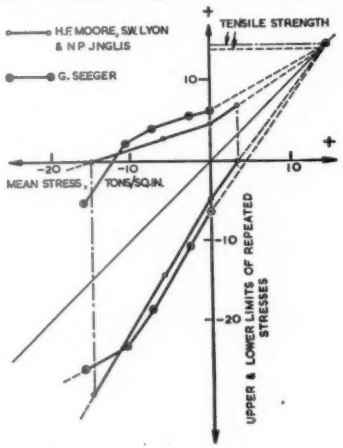


FIG. 12.—*Fatigue-strength diagram for cast iron with various tension and compressive mean stresses, comparing the results of Moore, Lyon and Inglis, and Seeger (Pomp and Hempel).*

malleable cast iron. The increase in safe-stress range due to a mean compressive stress was much lower for malleable iron than for grey cast iron. With compressive mean stresses, grey cast iron fractured at 40 to 80 deg. to the stress direction but for malleable iron the angle was 90 deg.

Fig. 15 gives the endurance curves for the push/pull tests by Pomp and Hempel[28, 13] on a grey cast iron having a tensile strength of about 11 tons per sq. in. The ordinate is the maximum stress in compression; the parameter is the minimum stress in compression. As the minimum stress increases, the lines slope less to the abscissa, a small change in stress at high mean compressive stresses changes the endurance appreciably.

Pomp and Hempel[12] also carried out torsion-fatigue tests on malleable cast iron at various mean stresses and their results are typified by the diagrams shown in Fig. 16. The safe-stress range for mean stresses below the "yield-point" is approximately independent of the mean stress. These investigators tested samples with the casting skin and after machining, and both in the as-normally-

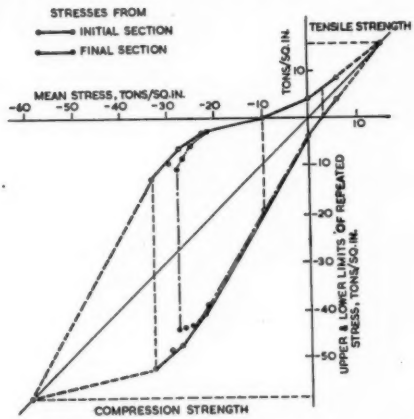


FIG. 13.—*Tension/compression fatigue-strength diagram for a flake-graphite grey cast iron (Hempel).*

annealed condition and after a pearlite-spheroidizing heat-treatment. The structural condition of the matrix only appeared to influence the samples having their casting skin intact. The spheroidizing heat-treatment slightly reduced the safe-stress

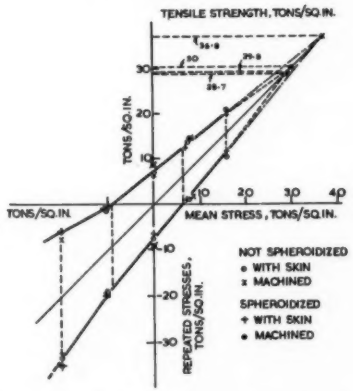


FIG. 14.—*Tension/compression fatigue-strength diagram for whiteheart malleable irons (Hempel).*

range while machining produced an increase.

Thum and Lipp[29], Ludwik[30] and Mailänder[31] have carried out various fatigue tests on cast irons subjected to various tensile mean stresses in bending, the tests being carried out on flat and inverted-T

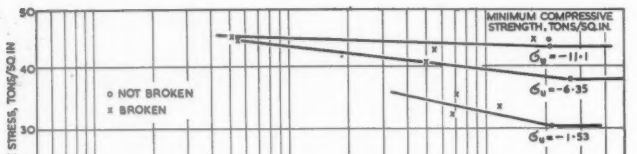


FIG. 15.—*Endurance curves for a grey cast iron with various compressive mean stresses (Pomp and Hempel).*

sections, and Fig. 17 summarizes their results.

Ludwik and Krystof[33] carried out cyclic torsional fatigue tests about a mean stress on two grey irons and their results are shown in Fig. 18. The stress range decreased markedly with increase in the mean stress values. The full lines indicate values for mean stresses up to a proof stress of 0.4 per cent. This result confirmed that of Moore and Picco[32] that the safe-stress range is greater for reversed stress, whereas it is constant for steels and malleable cast irons.

Elevated and Sub-Zero Temperatures

Cast iron is not normally suitable for use at elevated temperatures, particularly above 400 deg. C., and therefore the fatigue properties above this temperature are of little practical importance. One possible exception is the case of austenitic materials, where tests have shown that a useful limiting fatigue strength is maintained up to 625 deg. C. When a material becomes plastic—for example, lead at room temperature or cast iron at 600 to 700 deg. C.—the fatigue strength may be greater than the static strength determined during a prolonged test. The endurance ratio then becomes greater than unity.

Moore, Lyon and Inglis[7] determined fatigue strengths by repeated bending at 21, 540 and 760 deg. C., and also tensile stress/strain curves and hardnesses at elevated temperatures. Based on short-time tensile tests, the endurance ratios for these temperatures were 0.40, 0.40 and 0.57 respectively. Based on a prolonged tensile test, however, endurance limits were higher than the tensile strength. Collins and Smith[9] carried out unnotched and notched fatigue tests (diametrical hole 0.032 in. dia.) on a 21.5 tons per sq. in. tensile iron. The fatigue strength was maintained up to 426 deg. C. the endurance ratio was approximately constant up to 650 deg. C.

The superiority of the high-temperature properties of an austenitic iron was shown by Collins[34]. He tested a nickel/copper/chromium austenitic iron (14.9 Ni, 6.9 Cu, 2.1 Cr. per cent.) at temperatures up to 625 deg. C. It had a fatigue strength of 6.3 tons per sq. in. at room temperature, which dropped only to 5.4 tons per sq. in. at 625 deg. C., but at intermediate temperatures the values were very erratic. The tensile strengths, on the other hand, dropped from 15.8 to 8.9 tons per sq. in., giving endurance ratios of 0.37 at room temperature and 0.60 at 625 deg. C. By comparing these properties with an unalloyed iron, he observed that the fatigue limit of the austenitic iron at 625 deg. C. was 90 per cent. of that at room temperature, whereas in the unalloyed iron the ratio was 40 per cent.

In connection with the failure of diesel-engine pistons and cylinder covers, Fitzgeorge and Pope[35] carried out fatigue tests at elevated temperatures on three irons (C, N and T) having room-temperature tensile strengths of 14.8, 17.2 and 19.0 tons per sq. in. The fatigue strength began to drop sharply at temperatures in excess of about 400 to 450 deg. C., as shown in Fig. 19.

Only one reference is known to fatigue tests at sub-room temperatures. These were carried out by Boone and Wishart[35] in a "cold room" at temperatures varying from +80 to −50 deg. F. The endurance limit increased from 4.0 tons per sq. in. at 80 deg. F. to 5.1 tons at −40 deg. F. The notch sensitivity of the material tested was very slight and did not change due to the temperature. With steels, Duralumin and brass, there was also no consistent change in the stress-concentration factors over this temperature range.

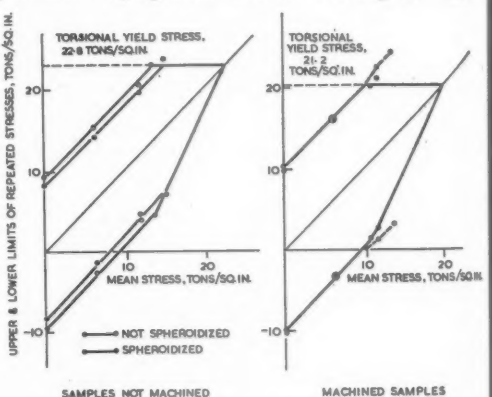


FIG. 16.—*Torsion fatigue-strength diagrams for whiteheart malleable irons with various mean stresses (Hempel).*

Surface Finish

Since ordinary flake-graphite irons have a relatively low notch sensitivity, it would seem likely that they are also insensitive to variations in surface finish. Thum and Ude[16] carried out tests after various degrees of filing, machining and polishing, but their results permit no definite conclusions. By roll-polishing, Pfannenschmidt[39] increased the fatigue strengths of two irons from 5.7 to 6.1 and 9.5 to 10.8 tons per sq. in. In another case it increased from 10.8 to 11.4 tons per sq. in. These improvements are very slight and further research work is required. Malleable irons and nodular irons might be expected to be more sensitive to surface finish. Mills and Love[41] found the bending fatigue strength of cast-crankshaft test-pieces to be un-

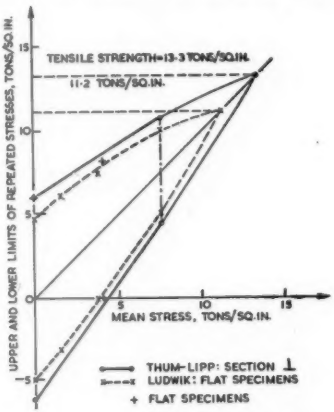


FIG. 17.—*Bending-fatigue curves for various mean stresses* (*Pomp and Hempel*).

influenced by surface finish. In bending fatigue tests, Hempel[28] found the strength of the higher-strength irons was considerably improved by machining away the cast skin, as shown in Fig. 20.

Heat-treatment

The work already dealt with, by Palmer and Gilbert[19, 23, 24], has shown the influence of annealing on the fatigue properties of nodular irons. These investigators have also studied the fatigue properties of nodular irons after quenching and tempering[26]. This treatment has been used for small nodular-iron crankshafts[37]. They found a remarkable increase in tensile and proof stress, but the bending fatigue properties were not increased proportionally. The heat-treated materials had tensile strengths of 60.1 and 66.7 tons per sq. in. compared with 43.0 tons per sq. in. for the as-cast material. The unnotched fatigue strengths were 18.0, 22.0 and 22.0 and the notched fatigue strengths 11.5, 13.5 and 12.6 tons per sq. in. respectively. The endurance ratios were decreased and the notch sensitivity increased by quenching and tempering.

Moore and Picco[32] have studied quenched-and-tempered flake-graphite cast iron and Eagan[38] has investigated the fatigue properties of grey irons isothermally quenched. The endurance ratios were found to decrease and the notch sensitivity to increase as a result of these treatments.

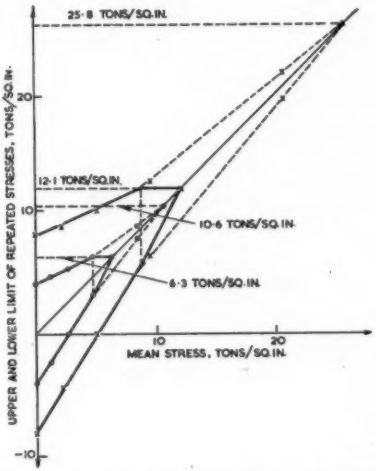


FIG. 18.—*Torsion-fatigue strength of grey cast irons with various mean stresses* (*Ludwik and Krystof*).

General and Concluding Remarks

A brief review of the general information available on the fatigue properties of cast irons has been given, treatment of specialized subjects, such as the fatigue of particular components and corrosion fatigue, being deliberately avoided. Thus, only those features which are of general interest have been included. The consideration of the fatigue of particular components introduces questions of

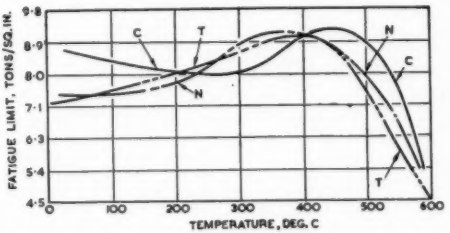


FIG. 19.—*Influence of temperature on bending-fatigue strength for cast irons C, N and T.* (*Fitzgeorge and Pope.*)

design, but it could be argued that progress in the field of the fatigue of iron castings could probably be more pronounced if further work was carried out in this manner. The application of the type of generalized data assembled here must be very

Fatigue of Cast Iron

limited. The admirable work of Love[40, 41, 42, 43, 45] and others on cast crankshafts illustrates the value of consideration of fatigue problems in relation to the design of specific components, and it is quite certain that many private organizations must have considerable information on fatigue properties in

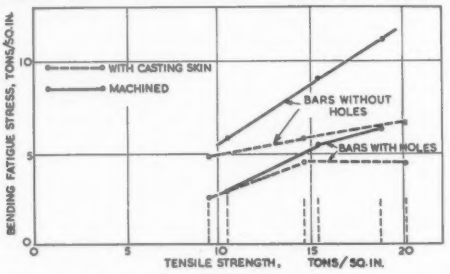


FIG. 20.—*Bending-fatigue strength of grey cast irons in relation to the tensile strength, for irons with the casting skin and corresponding machined specimens.*

relation to design. The recent paper by Fitzgeorge and Pope[46] relating the failure of diesel-engine pistons and cylinder covers to the fatiguing action of repeated combustion pressures and tensile stresses occurring as a result of temperature gradient in the walls is a further illustration of the desirability of combining considerations of fatigue, design and operating conditions.

The few papers on fatigue under combined stresses have so far been omitted from consideration, although they contain much valuable information, but this is difficult to interpret simply. Gough and Pollard[47] have carried out tests involving combined torsion and bending fatigue, and Love[40] has discussed the significance of these results in relation to the fatigue of crankshafts. Seeger[48] studied the bending fatigue of grey cast iron hollow test-pieces under axial compressive pre-stressing and found the former could be increased twofold by this. There is only a very limited discussion in the literature on the mechanism of fatigue failure in cast irons and much of this is highly conjectural.

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Non-ferrous Castings. A brochure received from Charles Carr, Limited, Grove Lane, Smethwick, 40, Birmingham, ranks high amongst the business literature published by the non-ferrous foundry industry to extol the virtures of its products. It is of a size—16 pages—which corresponds with the time the average buyer can usually devote to any one publication; it is nicely laid out, adequately illustrated, and, moreover, well printed. The firm, when it was started in 1864 by Charles Carr, was a bell foundry, but with the passage of time it has developed into a concern catering for the most rigid demands from engineers for castings. The data about these are clearly and concisely set out in tabular form. Quasi innovations, such as shell-moulded castings and non-sparking tools made from aluminium-bronze, come in for extensive mention, but a separate priced catalogue is devoted to the latter.

The reviewer congratulates those responsible for the production of such an acceptable brochure.

Midland Iron & Hardware Trade Increased

Both the volume of trade and the profits increased very considerably in the year ended July 31, 1956, reports Mr. G. A. Ryland, chairman of the Midland Iron & Hardware (Cradley Heath) Company, Limited. There was every indication that the purchase during the year of the capital of the Cradley Heath Manufacturing Company, Limited, would prove to be a valuable extension to the group's activities.

It is intended to continue expansion by the acquisition of further subsidiaries as the opportunity arises. For this purpose the group has cash and short-term investments exceeding £500,000. Trading for the first six months does not give grounds for pessimism, says Mr. Ryland, but conditions generally will be difficult for some months.

Mr. H. CLARK and Mr. H. A. REDSHAW have been appointed directors of Qualcast, Limited, Derby.

Equipment & Supplies

Nitrogen Degassing

The Morgan Crucible Company, Limited, of Battersea Church Road, London, S.W.11, have made available, free of charge to founders, sketches and detail drawings of simple "home-made" nitrogen degassing equipment (for use with tilting furnaces) the general arrangement of which is shown in Fig. 1. The apparatus has been designed so that it can be made without any machining—it requires only welding, a pistol-type drill and a hacksaw.

The main column is a piece of 2-in. steam pipe with a 2-in. flange screwed or welded to the end and the rotating part at the top is simply a piece of 1¼-in. pipe with a flange welded on. This slips quite easily into the 2-in. pipe and no elaborate bearing is needed. Morgan's supply plumbago tubes for immersion in molten metal and also a steel socket having a special thread at one end to fit the plumbago tubes and a ¼-in. BSP thread

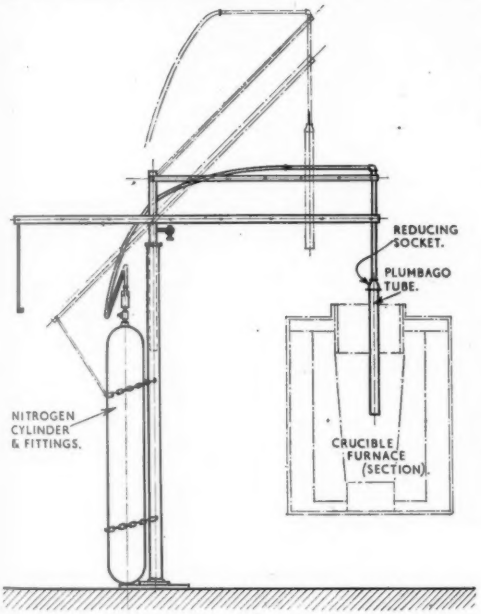


FIG. 1.—*Sketch of a "home-made" rig for the nitrogen degassing of crucible melts of non-ferrous metals. Overall height and dimension "B" can be arranged to suit melting-point layout. Broken lines show the apparatus in the raised position.*

at the other end. There tubes can either be used in the apparatus shown in the drawing or can be made portable, with a small steel extension tube which is available if required. The model which the Morgan concern use themselves is mounted on casters so that it can be moved from one furnace to another whereas the drawing shows the outfit fixed to the floor. For degassing of aluminium alloys with chlorine, an electro-graphite tube is recommended, since chlorine attacks plumbago.

CO_2 Flowmeter

The CO_2 Process is widespread in foundries, but the present methods of applying the gas lead to erratic results and are wasteful of CO_2. The apparatus illustrated in Fig. 2 has been designed by the Carbon Dioxide Company, Devonshire House, Piccadilly, London, W.1. Its object is to eliminate this wastage and to ensure consistent and reproducible results as far as possible.

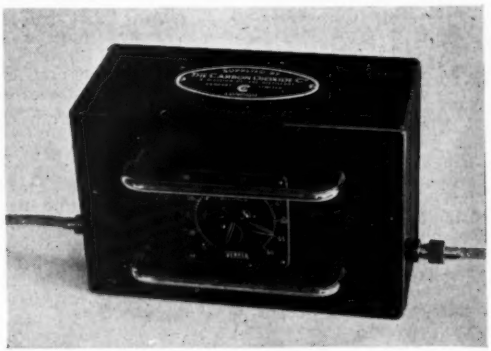
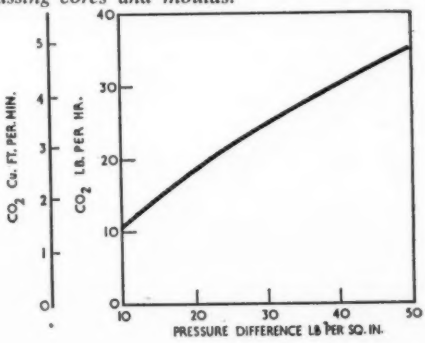


FIG. 2.—*CO_2 Flowmeter developed by the Carbon Dioxide Company, Limited, for automatic control of gassing time.*

The equipment fits into the pipeline between the CO_2 source and the outlet to the corebox or mould. The period of time for which CO_2 is to be allowed to flow is preset on the dial, and on the model shown this time can be varied between 3 and 60 secs.—other models are available for longer gassing times. The *rate* of flow of gas is controlled by an accurately calibrated orifice in the equipment and can be varied by adjusting the CO_2 regulator pressure in accordance with the graph (Fig. 3), due regard being paid to the gassing pressure of the core or mould. Operation of the instrument is effected by pressing a button in the centre of the dial. This starts the timer and opens the CO_2 valve. After the preset period the gas flow is shut off, and the timer resets ready for the next cycle. Inlet and outlet connections are normally ¼-in. BSP.

FIG. 3.—*Graph relating flow time with consumption for various pressures of CO_2 supply when gassing cores and moulds.*



Notes from the Branches

Birmingham

A meeting of the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen was held at the James Watt Memorial Institute on Wednesday, January 23, at which a Paper entitled "Methods Engineering as Applied to the Steel Foundry," by E. Daybell, of K. & L. Steelfounders & Engineers, Limited, was presented.

Mr. Daybell commenced by saying that before methods engineering became a science it must have been practised previously by foremen and craftsmen, and went on to say that standard methods of production must be laid down—apparently the first standards being those issued by Henry VIII for the manufacture of ordnance. Explaining that the tempo of production had so increased in foundries generally that a methods department was necessary to assist the shop foreman, Mr. Daybell continued by saying that there must be a two-way passing of information with the methods department acting as the nerve centre of all the other foundry departments.

The Author then showed examples of how alterations in certain patterns had made production easier, with less risk of failure. He next turned to the question of cores and quoted good instances where standardization had paid dividends and how by the use of exothermic materials and changes in pattern equipment, a considerable saving in fettling could be made. He concluded by reiterating that the value of a methods section was as a service department to assist all other departments, but more especially the foundry foreman.

Mr. J. L. Francis, in thanking Mr. Daybell for his Paper, said how much he agreed with what he had said regarding the value of such a department. Mr. Z. Stokowiec seconded the vote of thanks, and after a lively and interesting discussion the meeting was closed, at approximately 9 p.m.

Northampton Section

On Saturday, January 12, the Northampton and district section of the East Midlands branch held a "Brains Trust" at the Plough Hotel, Northampton, from 6 to 8 p.m. This was a most successful meeting, and such an event may now become a regular feature of the section programme.

The "Brains" were provided by Mr. J. Hill (past-president of the branch and development engineer at Ley's Malleable Castings Company, Limited); Mr. J. C. Howard, M.B.E. (deputy managing director of Foundry Equipment, Limited), and Mr. H. P. Miller (a past-president of the branch, and foundry manager at the Holwell works of the Stanton Ironworks Company, Limited). Mr. L. W. Bolton, section president and manager of the Nuffield Foundry, Wellingborough, was "question master" and the attendance numbered 41.

The questions were extremely varied and of general interest, being dealt with in a most capable manner by all the members of the team. When asked for their views on the best method of heating a foundry or fettling shop, Mr. Hill and Mr. Howard recommended the use of radiant-heat panels which, as pointed out by Mr. Hill, could in certain cases be run by using waste heat from the cupolas to generate the necessary steam or hot water, Mr. Paton Miller adding the opinion that individual cast-iron stoves still had much to offer for economical and effective heating, particularly where the utilization of waste heat was not practicable.

The Brains Trust were in agreement over the slackening of development of the CO_2 Process, which was thought to have taken place recently. Mr. Howard remarked that he was always surprised at the conflicting views expressed as to the usefulness of the Process. Mr. Hill gave as his opinion the fact that the Process was unlikely to replace to any great extent conventional oil-sand core practice for work such as is called for in the automobile industry, and all agreed with Mr. Paton Miller's suggestion that one of the greatest uses of this process so far, seemed to be as a substitute for poor green-sand practice in jobbing shops.

Automatic Moulding Units

Answering a question on the desirability of using fully-automatic moulding units, which seem to increase output rather than to reduce costs, Mr. Hill mentioned that hardly any truly automatic units existed, because certain small operations still had to be manually performed. Mr. Howard stated that he considered that the future pattern of development for this country should be centred round conventional moulding equipment, with every form of mechanical aid applied to it. He did not feel that "automation" was anything more than an intensification of mechanization which had been going on for years, despite the fact that it had accelerated a little in the last few years. Although, he pointed out, automatic moulding equipment had perhaps not reached its peak of efficiency yet, some automatic coremaking operations had got to this stage, and the experience gained therefrom would no doubt assist moulding developments.

Mr. Paton Miller, after expressing the thought that automatic working of any kind which assisted productivity and obviated bad working-conditions was desirable, added the rider that whether we like it or not, automatic moulding was on the way and nothing would stop it.

Beds and Herts Section

The difficulties in travelling to lectures, due to the petrol shortage, have necessitated changes in the programme for the Beds and Herts section, and the secretary informs members that future meetings this session in Bedford (normally held at W. H. Allen Sons & Company's works) have had to be cancelled. This applied to the meeting last week and applies also to that scheduled for April 11, which was to have been the annual general meeting of the session. To accommodate this, the meeting arranged for March 14 has been put back to March 21; it will take place at K. & L. Steelfounders & Engineers, Limited, Letchworth, but (owing to the date change) the speaker will be Mr. E. Barleggs instead of Mr. H. W. Keeble, and the subject will be the "Inspection of Castings."

West German Steel Output Up

Output of steel in western Germany during January equalled last November's record at 2,050,000 tons. The increase over January, 1955, was 3 per cent. at 1,945,000 tons. There is a prospect of a further rise in output of 5 per cent. with about six more steel furnaces coming into production during the next six months.

A further capacity reserve of 6 per cent. lies in the agreement with the unions to work a rota system throughout the week, including Sundays—a 168-hour total. The agreement fixed January 1, 1958, as the target date, but each company has been given latitude to introduce the scheme earlier or later, as technical conditions determine.

Russian Blast-furnace Practice

Wider Use of Constant-humidity Blast and High Top-pressure

Improvements in blast-furnace operation are being achieved in the USSR by the use of wet blast of constant humidity and extensive application of high top-pressure. The following article, which is of interest to founders and may have some applications in cupola metal, describes recent work[1] on these two aspects.

HUMIDIFIED BLAST

One of the main conditions of steady and efficient blast-furnace operation is that all the technical factors influencing production shall be held constant. Until recently, a variable factor in blast-furnace operation was the humidity of the blast, which can vary considerably from a few tenths of a gramme per cubic metre to 20 g. and more, with the season and the time of day. A. P. Afanasiev suggested introducing steam into the blast in 1937 in order to control the heating and operation. This method was patented by Gabrielian (USSR Register of Inventions, 4th issue). In 1939 to 1940, successful experiments on the use of humidified blast were carried out in the smelting of open-hearth pig and cast iron at the Kuznetsk, Magnitogorsk and Novo-Lipetsk iron and steel works.

During 1950 to 1952, investigations were carried out at a number of works into the effect of the humidity of the blast on the efficiency of blast-furnaces and on the quality of the pig and the steel produced with it. It was found that the efficiency rises as the absolute humidity of the blast is increased, provided that the temperature of the hot blast is raised to make up for the heat expended on the resultant endothermic reaction.

Productivity Increase

These experiments, and the results obtained when blast-furnaces changed over to constant working with humidified blast, proved the effectiveness of the method. It was found that every additional 10 g. of moisture per cub. m. increases the productivity of the furnace by 3.5 to 4.5 per cent. and decreases the expenditure of coke per ton by 1 to 1.5 per cent. The increase in productivity of blast furnaces working with a humidified blast of constant humidity is mostly due to the intensification of the smelting process brought about by the oxygen released through the decomposition of the steam in the furnace. Every 10 g. per cub. m. of moisture introduced into the blast increases its oxygen content by 3 per cent. (its absolute oxygen content by 0.63 per cent.), and increases the productivity of the blast furnace by approximately the same amount. The use of humidified blast improves the reducing power of the gas; every 10 g. per cub. m. of moisture in the blast during its breakdown in the furnace increases the hydrogen content of the shaft gases by 1 per cent. The intensification of the smelting process and the raising of the furnace temperature which result from this method do not reduce the efficiency since the hearth temperature remains practically unchanged.

The steam is introduced into the blast main before it enters the stoves, and Soviet technicians state that there is no increase in the cost of pig-iron by the humidified blast process, since the cost of the steam and the increased consumption of blast-furnace gas to heat the blast heaters are offset by the saving of coke and the reduced overall cost of producing 1 ton of iron.

Hydrogen Content of Product

An investigation has been carried out in a number of works situated in regions with different air humidities into the effect of humidified blast on the hydrogen content of the pig-iron and the steel produced from it, on the liability to flake and the mechanical properties of the metal.

The hydrogen content of the pig-iron and steel was ascertained by the method now generally used, *i.e.* in cast water-quenched samples by hot extraction (650 deg. C.) of the hydrogen under vacuum.

Results of the investigation showed that increasing the blast humidity up to 30 g. per cub. m. does not increase the hydrogen content of the pig-iron samples. The hydrogen content of the pig-iron after passage through the mixer is greater than on tapping from the blast-furnace, because of the high steam concentration in the combustion products above the surface of the molten iron when the mixer is heated by coke-oven gas.

Investigation into the mechanical properties of steel has shown that humidified blast has no adverse effect on its mechanical qualities. Practical tests over a long period in a large number of blast-furnaces in many factories have confirmed the results of these experiments and shown that humidifying the blast considerably increases the productivity of blast-furnaces without lowering their technical efficiency or economy, or the quality of the steel in the end-products.

HIGH TOP-PRESSURE

According to the Russian report the theoretical basis for the use of high top-pressure in blast-furnaces was explained by P. M. Esmanski as early as 1915 (*Journal of the Russian Metallurgical Society* (1915), **3**, Pt. 1, 384 to 403). The advantage of converting blast-furnaces to high top-pressure is mainly that it speeds up the reactions of reducing and carburizing the iron. He proposed that regulating valves should be installed in the waste-gas ports to increase the pressure of the gases in the furnace. P. M. Esmanski also suggested in that article that the composition of the pig-iron could be changed by increasing the gas pressure.

Russian Blast-furnace Practice

This idea was put into practice for the first time on an industrial scale in the USSR by I. I. Korobov at the Petrovsky plant in 1940. The results of the experiments were described in the journal *Stal* (1942), *9* and *10*. Korobov maintained that the chief advantage of converting blast-furnaces to high top pressure was that the intensity of smelting could be increased. He paid particular attention, not so much to speeding up the process of iron reduction, as to decreasing the volume of the gases and consequently lessening their speed and the pressure drop between the tuyeres and the furnace top. This ensures even furnace operation with more intense smelting.

In 1950, the conversion of one of the blast-furnaces at the Magnitogorsk metallurgical plant to high top-pressure operation was the signal for the extensive introduction of this system in Soviet blast-furnaces. At the present time, 43 blast-furnaces are working with high top-pressure. Increase of pressure to between 0.5 and 0.7 atm. raises productivity by between 5.5 and 8.5 per cent. through increasing the intensity of furnace operation by 4.5 to 6 per cent. and reduces coke consumption by 0.5 to 2.5 per cent. The upper limit of productivity corresponds to the smallest saving of coke.

Gas Cleaning

Practice has shown that if the top pressure is increased to between 0.35 and 0.40 atm. the gas is considerably easier to clean.

Investigations into the dust content of gases in various parts of the gas system have shown that, after passage through a high-pressure scrubber and a throttle-valve system, more than 99 per cent. of the dust has been removed from the gas stream. When the top-gas pressure is increased beyond 0.5 to 0.6 atm., a still greater proportion of the dust is deposited in the scrubber and throttle valves.

The high efficiency of the gas cleaning in the high-pressure scrubber and the throttle-valve system has made it possible to lower the voltage on the precipitators. The final cleaning of the gas in the electric precipitators and the disintegrators is carried out without loss of electric power, simply by changing the direction and speed of the gas flow. As a result, electricity consumption in gas cleaning has been reduced by 80 to 90 per cent. The amount of water used for spraying precipitators has also been reduced. Water consumption for gas cleaning in a number of works is about 3 cub. m. per 1,000 cub. m. of gas.

If gas is cleaned in this way, the final dust content does not exceed 10 mg. per cub. m. and in some works constitutes only about 3 mg. per cub. m.

General Results

Investigation of the process of blast-furnace smelting with high top-pressure in a number of works has shown that:—

(1) With the smelting technique generally used, the extent of the oxidizing zone in a radial direction changes very little.

(2) The central part of the furnace is highly permeable to gas and provides normal conditions for the reduction and heat-exchanging processes.

(3) The pressure drop between the throat and the tuyere zone is reduced, permitting the furnace operation to be intensified without interrupting the even shrinkage of the burden; at the level of intensification achieved, the general pressure drop remains somewhat lower than in ordinary furnace operation.

(4) Increased top-pressure makes it possible to utilize more fully the reducing and heating power of the gas, which has led to some increase in the carbon-dioxide content of the throat gases in all blast-furnaces. This has meant some saving in fuel consumption.

(5) Blast-furnaces operating at high top-pressure produce iron of more even composition, so that iron for open-hearth use can be smelted with a smaller silicon content.

Furthermore, theoretical considerations, laboratory experiments and the statistical treatment of production data suggest that the decrease in the silicon content of the pig-iron and the slight increase in its carbon content are to some degree connected with changes in the carburizing of the iron and in the reactions of silicon reduction, resulting from the increased pressure of the gases in the furnace.

Furnace designers and research scientists in the Soviet Union, it is stated, are working to increase the robustness of blast-furnace equipment, improve the technique of smelting, and carry out further investigations into the blast-furnace process in furnaces working at high top-pressure.

REFERENCE

[1] "Use of Wet Blast of Constant Humidity in Blast Furnaces" and "Use of High Top-pressure in Blast Furnaces." Articles submitted by the delegation of the USSR to the secretariat of the Economic Commission for Europe, and published in "Advances in Steel Technology in 1955," United Nations, Geneva, in 1956. (22s. 6d.)

CHIEF GUEST of Sir Peter Roberts, the Master Cutler, at the Cutlers' Feast in Sheffield on April 5 will be the Prime Minister, Mr. Harold Macmillan. Sir Anthony Eden had previously accepted Sir Peter's invitation to attend the Feast.

Sir Peter, who is Conservative and Liberal MP for the Heeley Division of Sheffield, is chairman of Newton, Chambers & Company, Limited, and the Wellman Smith Owen Engineering Corporation, Limited, and a director of the Barnsley District Coking Company, Limited, and Wombwell Coke & Bye Products, Limited.

THE PROCEEDINGS of the conference on "Oil-firing of Industrial and Commercial Boiler Plants" held in November last, are now available from the Combustion Engineering Association, 6, Duke Street, St. James's, London, S.W.1, Price 5s.

W. H. ALLEN, SONS & COMPANY, LIMITED, engineers, Bedford, are closing their foundry at Queens Engineering Works at the end of this year in order to carry out the reorganization and expansion of other sections of the works. About 150 workers will be affected but arrangements will be made for them to enter other departments if they wish.

Hot-dip Galvanizing Cast Iron*

Requests from foundrymen for information concerning the hot-dip galvanizing of cast iron are not infrequent and given below are the principles underlining this process. It is carried out for protection against corrosion, and consists in providing a layer of zinc by immersion in a bath of the molten metal. The earliest mention of this subject is to be found in a paper which, the French chemist, Melouin, presented to the Academie Royale in 1742. The first patent was granted in England in 1805, and a French one was taken out by Sorel in 1836.

The basic principles of the process are very simple, the castings to be treated are cleaned, suitably prepared, fluxed, immersed in a bath of liquid zinc and when withdrawn are covered with an adhering layer of this metal. The quality of the coating is dependent upon many factors; amongst which are the preliminary cleaning of the castings, final covering of the bath, its temperature control, and the use of additives.

Surface Preparation

The cleaning of the castings is an essential preliminary operation, as the quality of the coating depends for the most part on the cleanliness of the metallic surfaces. It consists in removing superficial oxides and other foreign bodies by mechanical methods or by descaling in an acid bath. Hot-dip galvanizing being basically a surface reaction, the microstructure of the iron has an influence on the formation and adherence of the layer of zinc. This depends upon the intermediary of a layer of iron/zinc alloy. The surface constituents of the castings are graphite, carbides and ferrite, of these only the graphite is not wetted by the liquid zinc. It is essential therefore that this element should not be loose on the surface before galvanizing, otherwise small uncoated areas will result. Malleable cast iron, which has a decarburized and wholely ferritic surface structure needs special consideration. For this, the process of galvanizing is similar to that employed with steel.

Amongst the many methods of surface preparation possible, only two are of practical value to the galvanizer:—(*a*) Shotblasting and (*b*) acid descaling; the former method gives the best results for the removal of the casting skin, but it should be followed by a short immersion in a bath either of hydrochloric, sulphuric or hydrofluoric acid. When the shop operates on an intermittent schedule for grey-iron castings, it usually carries out descaling in either a sulphuric or hydrochloric acid solution, fairly strongly charged with iron salts or containing an inhibitor. The use of hydrofluoric acid for descaling offers certain advantages as it dissolves siliceous residues from the surface of the metal and attacks the ferrite less than does hydrochloric acid, and so delays the exposure of graphite and the drawbacks referred to earlier.

Fluxing and Galvanizing

After descaling, the castings are covered with a flux which decomposes at the temperature of the zinc bath to give rise to the production of hydrochloric acid which eliminates the last traces of surface oxides. Two methods can be employed:—

(1) *Wet Process.* This process is suitable for castings of simple shape not containing any pronounced pockets. The surface of the zinc bath is separated, by a thick sheet, into two parts, one of which is covered by flux essentially composed of ammonium chloride and zinc chloride. The castings are introduced into the bath through this flux—which constitutes a sort of cover—and are withdrawn from the free-from-flux section.

(2) *Dry Process.* In this method, the castings are immersed in a concentrated solution of double chlorides of zinc and ammonium, then dried at 120 to 150 deg. C. and plunged directly into a bath of uncovered zinc. After a period of time, varying from 30 sec. to a few min., depending on the weight and type of castings, they are withdrawn from a part of the bath which has been skimmed free of dross to avoid contamination by surface oxides which are invariably present. The castings are shaken to remove the excess liquid zinc and then plunged into a trough of running water. This is done to avoid slow crystallization of the zinc surface and thus improve its brilliance.

Zinc Bath

The bath used for galvanizing consists of high-purity zinc with an addition of aluminium of the order of 0.10 per cent., or in some cases tin. This also improves the appearance of the coat and reduces oxidation of the liquid zinc at working temperature, in the neighbourhood of 450 deg. C.

At the bottom of the bath there is a layer of lead which carries the "matte," of zinc/iron alloy rich in zinc; this is formed by the reaction of the surface oxides of the castings with the liquid zinc. Thus, the matte fills the bottom of the vat and floats in the lead which is periodically recovered. The vat containing the galvanizing bath is usually heated by tar oil burners, and is made from very mild steel about one-inch thick.

* Translated from *Fonderie.*

BRITISH RAILWAYS are to adopt, as standard, the ex-LNER type of sign with metal cut-out figures, as an aid to drivers to indicate the commencing point of permanent speed restrictions. It is stated that some 11,250 signs will be needed throughout British Railways.

The Very Reverend H. G. MICHAEL CLARKE, M.A., (Provost of Birmingham) was the guest speaker at the Non-Ferrous Club's February meeting. The subject of the address was "Human Relations." A collection taken on behalf of the Bishop of Birmingham's Jubilee Appeal totalled £23.

Jointing of Patterns

By "Chip"

The manner in which a pattern is moulded determines the position of its joint. First impressions regarding the position of the joint should be regarded with caution, for example when parts of a casting are required to conform to small tolerances it is better to mould these direct from the pattern as there is a possibility of inaccuracies in core positioning if separate cores are used. Fig. 1 shows a casting illustrating this problem, it has recesses the positioning of which is critical. The first pattern supplied was made to mould the casting in one section, the joint being on the plane BBB, and a flat top was employed. The recesses at A were

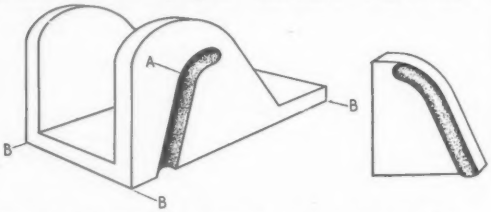


FIG. 1.—*Sketch of the casting to be produced showing the position of the recess A, and the plane jointing. (Right) The core designed for use with the pattern.*

taken out by means of cores, one left hand as illustrated and one right hand. Complaints about castings produced by this method were received as it was found necessary to chip out the recesses, due to core shift which occasionally occurred. To avoid this error a new set of patterns were made, the jointing was through the centre, with the recesses cut out of the pattern; after this no further complaints were received.

Tom Makemson Award

On Tuesday evening, last week Mr. George Dyson, of Harehills, Leeds, an employee of the West Yorkshire Foundries Limited, was presented with his City and Guilds Certificates at the Pudsey Technical Institute by the Mayoress of Pudsey, (Mrs. Frank West). In gaining his certificates he has also been named the best all-round apprentice in all England for patternmaking. He thus receives the Tom Makemson Award (of the Institute of British Foundrymen) of £25 being the first apprentice to receive this recently-established memorial of the late IBF secretary. His employers are so pleased with his progress, that they have given a further £25 on which he can draw for the purchase of equipment. He has been at the West Yorkshire Foundries since leaving school six years ago, and hopes to attend a two-year course at the Foundry College.

THE GLASGOW DEPOT of Scammell Lorries, Limited, at 111, Shakespeare Street, Maryhill, has now been closed; spares facilities for Scammell operators will in future be provided by the combined Leyland and Albion centre at 48-56, Hawick Street, Yoker, Glasgow, W.3.

Projects for the Polish Foundry Industry

Dr. S. Pelezarski in *Przeglad Odlewnictwa* (the Polish foundry Journal) has summarized his review of the Polish foundry industry as follows:

The metallurgical processes are enumerated, among which special attention should be paid to hot-blast cupola operation, the wider application of water cooling and the introduction of the basic-cupola process. In the sphere of foundry alloys the necessity of extending the production of cast iron of the higher classes such as nodular cast iron and special-alloyed cast irons; in the field of light metals the development of the production of magnesium-alloy castings is stressed.

In the section of moulding materials the gradual trend to exothermic mixtures is foreseen as well as a wider application of cement mixtures. In the field of moulding technique exothermic and insulating mixtures for risers are being introduced on an industrial basis as well as electric-arc heating of risers for heavy steel castings. Shell moulding will be developed in several foundries during the next few years. Preparations are also being made to introduce the "lost-wax" process into some of the foundries, the technique of which has been worked out by the Foundry Research Institute.

In the development programme for the next few years there is planned an extended development of die-casting and centrifugal casting. Much attention will also be paid to pressure-die-casting. In the field of mechanization the construction of some mechanized foundries and the modernization of several existing plants is foreseen. Great attention is paid to the development of works laboratories which will collaborate with the Foundry Research Institute in the field of research work.

January Steel Production

Last month's steel production, at the rate of 415,900 tons a week, was 10,000 tons a week above the average for January, 1956. Pig-iron output was slightly less—256,900 tons a week, compared with 260,700 tons, mainly due to the temporary closure for repairs of the large blast furnace in South Wales. The furnace will be back in production shortly. The closure also affected steel output.

Although steel production continues to increase and the demand for a number of products, particularly plates and heavy sections, is very heavy, there was some decline in the latter part of 1956 in overall consumption.

The table below gives the latest steel and pig-iron output figures (in tons) and compares them with earlier returns.

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1956—November ..	262,700	13,660,000	426,400	22,172,000
December ..	262,300	13,637,000	395,900	20,587,000
1957—January ..	256,900	13,361,000	415,900	21,627,000
1955—November ..	252,600	13,135,000	408,600	21,246,000
December ..	250,100	13,004,000	381,900	19,860,000
1956—January ..	260,700	13,558,000	405,200	21,069,000

BRITISH BATH COMPANY, LIMITED, has had plans prepared for the erection of extensions to their premises at Long Drive, Greenford, Middlesex.

Company News

INTERNATIONAL COMBUSTION (HOLDINGS), LIMITED—A final dividend of 15 (12½) per cent. is announced, making 22½ (20) per cent.

METAL INDUSTRIES, LIMITED—As foreshadowed, the company is resuming dividends on the £3,900,000 ordinary stock with an interim of 3 per cent. in respect of the year to March 31, 1957.

FRANCIS MORTON & COMPANY, LIMITED, constructional engineers, of Liverpool—The company announces the acquisition of the issued capital of Bates & Bates, Limited, specialists in welding and welding controls, of Birmingham.

ENFIELD ROLLING MILLS, LIMITED—The company announces that a contract has been signed for the acquisition by the company of the whole of the issued share capital of the Aston Chain & Hook Company, Limited, Birmingham.

JOHN BROWN & COMPANY, LIMITED—The company has acquired from Richard Costain, Limited, the latter company's 50 per cent. share holding in Costain-John Brown, Limited, operating in the Middle East and elsewhere. Sir Richard Costain and Mr. A. P. Costain have resigned from the board.

GOODLASS WALL & LEAD INDUSTRIES, LIMITED—An offer of 4s. 1d. per ordinary share has been made to Quirk, Barton & Company, Limited, manufacturers of sheet lead, pipes, etc., of St. Helens (Lancs), and the directors recommend that it should be accepted. Vendors are entitled to the second interim now declared; no final will be paid. The company recently acquired the balance of share capital of Enthoven Fry, Limited, Johannesburg, which now becomes a wholly-owned subsidiary.

HENRY HOPE & SONS, LIMITED, manufacturers of metal windows, etc., of Smethwick—The company has announced that the consent of the CIC has been obtained to the issue to ordinary stockholders of 300,000 new £1 ordinary shares at 25s. per share. The issue will be made to stockholders registered on February 15. To provide the necessary shares, it is proposed that the unclassified shares be converted into ordinary and an extra-ordinary meeting will be held at Smethwick on February 27 for this purpose.

ANTI-ATTRITION METAL COMPANY, LIMITED—The chairman, Mr. T. M. Priestley, points out that business is playing an ever-increasing part in the manufacture of the castings and machined parts required for electronic devices, atomic energy research, and oil refinery equipment. Trade expansion at Chard is continuing, and another satisfactory result in 1957 can be expected. A group profit of £105,613 (£66,843) is reported for the centenary year ended July 31, 1956. A centenary bonus of 1 per cent. is added to the unchanged dividend of 7½ per cent.

PRESSED STEEL COMPANY, LIMITED—The company announces its intention to issue 52,000,000 debenture stock which will carry the right of conversion into ordinary shares at fixed prices in the period from 1958 to 1964. Treasury consent has been obtained. The offer of the stock will be made to the company's ordinary and preference holders. It is proposed to create 4,000,000 5s. ordinary shares at an extra-ordinary meeting on March 7, the greater part being to meet conversion claims. These additional facilities are needed in connection with the longer-term plans of certain of the company's customers.

Publications Received

Berk in the Foundry. Issued by F. W. Berk & Company, Limited, Commonwealth House, 1-19, New Oxford Street, London, W.C.1.

This publication has been issued to commemorate the twenty-fifth anniversary of the year in which the company started doing business with the foundry industry as suppliers of bonding materials. First they handled Wyoming bentonite, and an interesting table is given showing the increasing popularity of this material. The introductory paragraph relates how, in the search for binders for foundry sands, home-compounded materials and imports from North Africa, Italy, and Cyprus have been offered. The rest of the brochure sets out in a standard form, using four graphs for each, the green-strength; dry-strength; permeability and shatter-test figures for sands with various binder additions, and later much of this information is assembled in composite graphs and tables. Throughout the book, recommendations are given as to which bond or combination of bonds to use for stated applications. The brochure is really very interesting and informative and it is available to readers on writing to Commonwealth House.

Fuel Economy Review, 1957. Published by the Federation of British Industries, 21, Tothill Street, London, S.W.1; price 5s.

The main article contained in this booklet is "Britain's Growing Needs of Energy" by Sir Harold Hartley, F.R.S., who dispels the popular notion that atomic energy will soon replace coal, which has still a great potential in this country's economy. Another article of interest is "Some Practical Aspects of the Clean Air Act," wherein the author discusses methods for the reduction of smoke and grit—mainly from boiler furnaces.

Shell Moulding as Applied to Castings in Hiduminium. Issued by High Duty Alloys, Limited, Slough, Bucks.

This is an unusual pamphlet as it is so revealing. It is stated that early production runs with shell moulding showed no advantages either in cost or quality over die-castings. Then it discloses that shell coremaking is a real "winner" for use with die-casting components. This well-illustrated 12-page booklet is available to readers on writing to Slough.

Bulletin and Foundry Abstracts, Vol. 13, No. 10. Published by the British Cast Iron Research Association, Alvechurch, Birmingham.

This issue is of great value to makers of glass moulds, as there is printed an extensive bibliography on the subject. As usual there are accounts of the activities of the Association and abstracts of current foundry literature.

New Catalogue

Single-toggle Breakers and Crushers. In publication 482, Hadfields, Limited, of East Hecla Works, Sheffield, tell how these machines are made—mainly from steel castings—specify sizes, weights and capacities, and wisely give an illustrated reference table of parts, together with their code numbers. Recommendations for driving units and information required when ordering are logically set out. The brochure finishes with general information about the firm's products and representation.

Law Cases

Foundry Development Opposed

A special Court of Appeal convened at Denny, Stirlingshire, Scotland recently, heard an appeal by Hunter (Denny), Limited, coppersmiths, brassfounders and general metalworkers, against a decision by the Stirlingshire Town and Country Planning Committee. The appellants, who have been in operation for the last 125 years, had applied to the Committee for approval for their plans to extend and modernize their premises by the erection of a new factory which would link with the railway system. This permission had been refused.

Mr. W. S. Carswell, solicitor for the Committee, stated that they had refused permission on the grounds that it was contrary to their development plans and would be detrimental to the surrounding area; in addition, the factory would be too close to the neighbouring houses.

Lt.-Col. A. F. Hendry, for the appellants, pointed out that after the first refusal his clients had reconsidered their proposals and a meeting was held between them and the local planning authority on the site of the proposed extension. During this meeting held on October 29, 1956, the entire subject was discussed and his clients had been willing to amend their plans so that the factory would not be so close to the local dwellings. It was agreed that this revision would be treated as part of the appeal. Col. Hendry said that he objected to the relevancy of the local development plans and contended that the first grounds for refusal were not valid. The second point of refusal, referring to the proximity of the local dwellings, he felt was a lever applied by the extraordinary power of the local planning committee. "Surely the firm was entitled to use their property as they wished, and as had been carried out in the past 100 years, until statutory authority was brought against them."

Sir Robert Russell, commissioner, presiding at the Court of Appeal, said that following the adjournment he would report his findings to the Secretary of State for Scotland.

Workman Wins Appeal

The employers, Newton Chambers & Company, Limited, Thorncliffe Ironworks, and the workman, Mr. Maurice Greensmith, of Chapeltown, were equally to blame for an accident in the foundry, it was stated in a judgment of the Court of Appeal on February 5. The appeal was made by Mr. Greensmith against the dismissal of a claim for damages at Sheffield Assizes last year.

Mr. Greensmith's left leg had been crushed between castings in a skip and the cab of an electric truck in the foundry on April 28, 1953. In giving judgment, the Lord Justice said that to have castings resting on the axle of a bogie was a faulty system and was the partial cause of the accident; Greensmith's action in standing on the bracket was not the sole cause of the accident. The employers were also at fault, and there would be judgment for Greensmith for £362 10s., half the assessed amount of damages.

ALFRED BULLOWS & SONS, LIMITED, of Long Street, Walsall, Staffs, have for the last three years been engaged on the perfecting of their Bullows-Berridge automatic spray-painting machines. A leaflet received from the company lists the improvements—ten in number—which have been made, and the information is of interest to those undertaking mass-production painting.

Fuel Outlook Less Gloomy

More cheerful news about the fuel-oil position was given by the Minister of Power, Lord Mills, when he met members of the National Production Advisory Council on Industry on February 8. The situation was "rather less gloomy" than could have been expected. For the first quarter, supplies would be maintained at a level closer to 80 per cent. of normal than to the 75 per cent. which the Government had originally expected. Supplies of petrol had been arriving at more than 80 per cent. of the usual rate, but supplies of diesel and fuel oil had been lower. Lord Mills would not make a definite forecast of the prospects, but he acknowledged that the present position could never have been achieved or maintained without the co-operation of the public and industry.

The Chancellor of the Exchequer, Mr. Peter Thorneycroft, told the meeting that conditions which must be fulfilled in order that the standard of living could not only go up, but stay up, were:—Enlarged and modernized productive capacity; competitive costs; building up of overseas markets; higher productivity from the labour force. Up to date the country had done very well towards more productive investment and more exports, but not so well in keeping costs steady and enlarging the national product.

"There is certainly no lack of export demand," he said. "It is strong and rising, and by our own efforts we can make it rise faster and further." Capital goods were one of the growing points of our export effort and new export orders for them were coming in a good deal faster last year than in 1955. The dollar area was prosperous as never before and there were signs that Australian and New Zealand imports might rise during the year. "There are good prospects for overseas sales this year—and oversea sales account for nearly a third of manufacturing industry's output. So we can't let up," the Chancellor said.

Hadfields' Share Offer

Ordinary shareholders of Hadfields, Limited, have been informed of an offer for sale of 620,449 ordinary shares of £1 each in Hadfields at 24s. 3d. a share. They comprise all the shares formerly owned or controlled by Mr. K. F. Landegger in the capital of Hadfields, and no part of the sale proceeds will be receivable by the company.

The shares offered rank for the final dividend of 5 per cent. recommended in respect of the year to September 29 last. On the basis of a total dividend of 9 per cent. the price of 24s. 3d. per share shows a yield of £7 12s. per cent. after taking into account 6.9d. per share for the net amount of the final dividend contained in that price. The price which Lazard Bros. has undertaken to pay the vendors is 23s. 3d. per share, the difference between this and the offer price being attributed to underwriting and overriding commission and stamp duty and expenses.

It is stated that the order-book remains satisfactory and that it is not expected that the group will be seriously affected by the present restrictions of oil supplies. The extent to which customers may be affected cannot be known, but so far there has not been any important reduction of orders on this account and the board see no reason why the current year should not prove satisfactory.

AVERAGE SELLING PRICES (calculated to the nearest 10s.) for December of members of the Federation of Light Metal Smelters were: LM1 £173 per ton; LM2, £169 10s.; LM4, £192 10s.; LM6, £206.

Steel Estimates—Optimistic

Estimates of steel requirements between 1960 and 1962 are too optimistic in the opinion of Mr. R. F. Summers, chairman of John Summers & Sons, Limited, Shotton (Ches). Speaking to the North Western Fuel Luncheon Club in Manchester, he said: "I believe that forecasts of steel requirements should be taken with reserve, especially in view of the recent recession in the motor industry."

The general estimate of annual demand for all types of steel in 1960-62 was about 28,000,000 tons. The figure would be right three years later, he thought, but in 1960 to 1962 the demand would be about 2,000,000 tons less. "The industry is not physically capable of so rapid an expansion," he said.

Mr. Summers went on to say that they must look at the motor trade recession as temporary, but he still believed its estimate for future production was too optimistic, particularly when the road situation of this country was considered. However, if the standard of living continued to rise then the demand for sheet steel would also rise as so many things for material comfort, such as cars and refrigerators, used considerable quantities of sheet steel.

The use of solid fuel in the steel industry had practically disappeared, and with it the smoke. The steam engine had almost gone and so had steam shunting locomotives. Therefore the industry was more dependent than ever before on oil. About the use of atomic power, Mr. Summers said that, so far as he could see, its impact would be limited to the generation of electricity, but "he did not know what was round the corner."

Before the war his firm produced 12,000 tons of sheet steel a week. By 1952 this figure had risen to 25,000 tons and in two years' time he expected it would rise to between 40,000 and 50,000 tons a week.

Unemployment Increases

Unemployment rose from 1.4 per cent. in mid-December to 1.8 per cent. on January 14 when there were 382,600 persons on the registers. This is the highest percentage since February, 1954. It is estimated that 10,000 workers were discharged in January because of the shortage of industrial and motor fuel.

Although short-time working in manufacturing industries declined in January, this was partly due to increased dismissals. In the first week of the month, 155,000 were working a short week, but by last week this total had fallen to an estimated 110,000. Between December 12 and January 9, vacancies on exchange books fell by 24,000 to 256,000. A year before there were 373,000 unfilled vacancies. For the first time for many years coal mining and the railways gained workers, as did engineering (manufacture of machine tools particularly), iron and steel production, chemicals and shipbuilding, aircraft and electrical machinery manufacture. Biggest losses were in motor vehicles and cycles, radio apparatus and valves.

A CONTRACT for the production and installation of five 200,000-h.p. turbines at the $150,000,000 power project at Chute des Passes, northern Quebec, has been awarded by Aluminium of Canada, Limited, to the English Electric Company of Canada, Limited. The latter is a wholly-owned subsidiary of John Inglis Company, Limited, Toronto, which, in turn, is controlled by the UK English Electric Company. The units are the biggest ever to be made in Canada.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

764,763. Union Carbide Limited, Grange Mill Lane, Wincobank, Sheffield, Yorks.

Improved exothermic reaction mixtures with particular reference to improvements in the exothermic ferro-alloy addition agents. It consists of aluminium 2 to 8 per cent. (as a reducing agent), sodium nitrate 5 to 15 per cent. (as an oxidant), the remainder being a ferro-alloy; an alternative oxidant may be sodium chromate. The ferro-alloy may be ferro-chromium. An alkali or alkaline-earth metal may be present as an accelerator. (See also Patent No. 764,818, which refers to an improved ferro-chromium-aluminium alloy suitable for an exothermic reaction mixture.)

764,978. Regie Nationale des Usines Renault, 8-10, Avenue Emile Zola, Billancourt, (Seine), France.

In high-resistance malleable cast-iron it becomes difficult to keep the structure free from graphite when sand-moulding massive sections. (See also Patent No. 738,094, FOUNDRY TRADE JOURNAL, October 20, 1955.) This can be remedied by having a composition such as the following: carbon 1.6 to 2.6, silicon 0.9 to 1.9, manganese 0.7 to 1.7, copper 0.1 to 2.1, and zirconium 0.03 to 0.9 per cent. Without altering the principle of the invention nickel can be added for hardenability.

764,990. Sutter Products Company, 2005, Westwood Avenue, Dearborn, Michigan, USA.

Machines for the manufacture of foundry cores. The apparatus is stated to automatically produce sand-cores in a compact and space-saving way. The automatic filling of the boxes is described as expeditious and efficient with the minimum of operations.

765,254. F. J. P. Horum, Dronningensgt, 50, Trondheim, Norway.

Apparatus for submerging briquettes in molten metal or alloy in a furnace. A refractory-clad support arm projects through a door into a furnace. A rod is detachably fixed by a rigid joint so as to depend from the end of the above arm inside the furnace; this rod supports a series of annular briquettes. The support arm itself is pivotally suspended in order to allow it movement from outside the furnace.

765,302. General Motors Corporation, Detroit, Michigan, USA.

The manufacture of cast-iron cylinder liners, whereby they are first cast and hardened; tempered; annealed and cold worked—these processes being applied to particular portions of the liners in order to improve their static strength, particularly at the point where the flange joins the barrel of the liner.

765,423. Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

A method of introducing an addition element of lower boiling point than iron into molten iron or steel in a vessel under gas pressure. The additional element and a container of molten metal are separately introduced into a pressure vessel. The vessel is then closed. The compressed gas is introduced into the vessel to raise the pressure to at least equal to the vapour pressure of the addition element at the temperature within the vessel. The molten metal and the addition element are then mixed by vigorous stirring while the pressure is maintained.

Indian Foundry/Forge Project

The Coates Mission to the Government of India is now nearing completion and its report is due for submission in the very near future. Among the many projects included is the foundry/forge scheme which is likely to be finalized and assessed in relation to the findings of the Mission. Apart from the selected organizations asked to submit the project reports, other parties have expressed interest in the scheme and are submitting offers, several of which are already being studied by the Indian Government.

The broad outlines of the proposed foundry/forge project have been indicated by Mr. J. Blakiston, technical adviser to the (Indian) National Industrial Development Corporation. They are designed to serve as a guide for the three organizations in Czechoslovakia, Western Germany and the United Kingdom (Campbell, Gifford & Morton, Limited) in submitting their detailed reports. He has suggested the Dhanbad-Bokharo-Ranchi area as "the most suitable location for accessibility by the main interests likely to participate in the project," and has submitted a memorandum to the Corporation on the nature and scope of foundry/forge works, in which he recommends that these should comprise a steel foundry, a grey-iron foundry and a forge. The annual production and weight capacity of the steel foundry may be 15,000 tons of finished steel castings per year, with an occasional maximum weight of 50 tons. The capacity suggested for the grey-iron foundry is 25,000 tons per year, with a maximum weight capacity of 50 tons. It is assumed that this plant will have to act as a balancing factor for the production of ingot moulds and slag ladles between the various steel projects. As for the forge, the capacity suggested is 5,000 tons yearly of finished forgings, with a maximum weight capacity of 15 tons.

Recommendations

Other recommendations include the proposal that there should be a heavy machine-capacity section, with a limited selection of heavy machine-tools, representing the major out-sizes of machine-tool capacity for the whole of India. It is desirable that the particular machine tools should be within the same area of the project so as to save on handling and transport. A heavy drop-stamp unit to work in conjunction with the heavy forge has been included in the project as an optional additional plant and a sub-section for the fabrication of heavy components from rolled-steel slabs would be complementary to the class of work envisaged. All these sections of the project should be so planned that the buildings and plant may be expanded longitudinally to enable the production to be doubled, if necessary, at some future date.

In his memorandum, Mr. Blakiston has also suggested that the project should consist of seven bays, each of a standard-size, 80-ft. span, with an overall length of 500 ft., capable of expansion in either direction. The first bay will be for a heavy machine-shop; the second for the forge and manipulatory fabrication; the third for grey-iron and steel fettling; the fourth and fifth for the steel foundry; and the sixth and seventh for the grey-iron foundry.

These terms of reference are given to the tenderers merely as guidance and any alternative which, in the opinion of the tenderers, is likely to reduce the capital cost or increase the flexibility of the plant, will be carefully considered. The basic conception of the scheme is to provide central heavy-engineering facilities for heavy industry which, on account of the capital outlay involved, may be beyond the means of private enterprise; and which can only be justified by serving in a comprehensive manner the aggregate out-size requirements of the constantly increasing and diverse engineering, chemical and power projects. On the basis of an assessment of the availability of suitable components for manufacture, a preliminary list has been prepared of those consumed by major industries. Once the project is established, it is believed that it will be well supplied with orders and able to select to its own advantage components most suitable for the facilities available. It is on this basis that the broad outlines of the foundry/forge project have been framed. Quotations are to be placed before the next meeting of the National Development Corporation.

British Standards Institution

The British Standards Institution in their *Information Sheet* for January announce the following new British standards:—B.S. 1121 Part 37:1957 Determination of nickel in iron and steel, price 2s. 6d.; B.S. 2741: 1957 Recommendations for the construction of simple smoke viewers, 3s., and B.S.. 2811: 1957 Smoke density indicators and recorders, 3s. 6d., B.S. 1121 Part 37:1957, specifies two methods, method A being applicable to all nickel contents and method B being applicable to nickel contents of up to about 0.25 per cent.

B.S. 2471: 1957 describes a variety of simple smoke viewers particularly suitable for fitting to individual furnaces of a battery to supplement the information provided by a smoke alarm or smoke-density indicator installed on the common chimney. Two types are described and illustrations give all various possible modifications. In B.S. 2811:1957 instruments are described for measuring the emission of black or grey smoke from a chimney in terms of optical density or percentage obscuration. Requirements are given for the light beam length, flow of air into the flue, length of cable between units, protection, cleaning and servicing electrical safety, wiring, connections for alarms and recorders, accuracy, instrument stability, ranging, effect of supply voltage variation and temperature, and marking of the instruments. Requirements are also given for the indicating meter used and for the recorders and alarms when these are fitted. Guidance on the installation of the instrument and on setting the alarm point is also given. Copies of these standards are available from the sales department of the Institution at 2, Park Street, London, W.1.

Austrian Enamellers Meeting

Arranged by *Verein Osterreichischer Emailfachleute* (Austrian Enamellers Technical Association), a course in enamel technology is to be held in Vienna from March 11 to 14 at which papers will be presented on (a) furnace craft, supervision of enamelling furnaces; (b) pickling and (c) management functions. On March 15 there is to be a general meeting of the Austrian Enamellers and on March 16, a visit to the Vienna Trade Fair. It is proposed that the (UK) Institute of Vitreous Enamellers should be represented and any person interested in attending should notify the IVE secretary Mr. J. D. Gardom, Ripley, Derbyshire, as soon as possible. As the Trade Fair is being held during this period and accommodation in Vienna is expected to be limited, the approximate cost to the UK delegates will be £70 0s. 0d., including first-class return air fare.

News in Brief

ORGANIZED by the *Vereniging van Metaal Industrieen*, the seventh International Mechanical Engineering Congress is being held at Scheveningen (Netherlands) from June 2 to 6, 1958.

MIDLAND SILICONES, LIMITED announce that the North-Eastern area sales office has moved from its former address to more extensive premises at 5/7 New York Road, Leeds, 2. The area sales manager is Mr. R. Nattrass,

WHEN THE QUEEN and the Duke of Edinburgh visit Worcestershire in April, visits to two factories only are in the programme. The selected factories are Frank Somers, Limited, Halesowen, and Stevens & Williams, Limited, Brierley Hill.

LORD TREFGARNE has resigned as a director and chairman of the Polygram Casting Company, Limited. Mr. C. J. MAPLES succeeds Lord Trefgarne as chairman, and Mr. W. A. D. BRYDEN who was director and secretary of the company, has resigned.

THE SCIENTIFIC FILM ASSOCIATION, 164, Shaftesbury Avenue, London, W.C.2, on behalf of the International Scientific Film Association, is organizing a three-day conference to be held at the French Institute, South Kensington, London, S.W.7, from April 4 to 6.

SANDERS & FORSTER, LIMITED, of Thames Works, Hertford Road, Barking, Essex (a member of the "Chamberlain" group of companies), announce that Mr. P. C. Beckett is to carry out a four months' tour of the Central Americas and the countries of the Caribbean.

IT IS ANNOUNCED by the British Plastics Federation that the British plastics industry had another record production and export year in 1956. Output, which has been more than doubled since 1950, reached about 335,000 tons, and increase of more than 10,000 tons compared with the total of 324,000 tons in 1955.

LICHFIELD'S ANCIENT WORSHIPFUL COMPANY OF SMITHS admitted to their roll five new Freemen when they held their annual Mayoral Court and Feast last week. Among the Freemen elected as practising smiths was the present Sheriff, Councillor H. P. Taylor, manager of the Lichfield foundry of Chamberlin & Hill, Limited.

IN COLLABORATION with the organizers of the Factory Equipment Exhibition, Incorporated Plant Engineers has arranged for a paper by Mr. E. C. Stevens, M.A., on "An Engineer Looks Ahead—Modern trends in factory design and equipment" to be presented at 2 p.m. in the Cromwell Hall of Earls Court on April 29, the first day of the exhibition.

NINTH COKE-OVEN ORDER: Iscor has ordered through Woodall-Duckham Construction Company, of London, another coke-oven plant for the Vanderbijl works. The estimated cost of the installation is £2,000,000. This represents the fourth of the Woodall-Duckham/Becker coke-ovens ordered by Iscor in the last two years, and the ninth battery to be installed by the same concern.

BRITISH INSTITUTE OF MANAGEMENT, Management House, 8, Hill Street, London, W.1, is organizing a conference to take place at the Prince of Wales Hotel, Southport, on March 22 and 23. Planned with the support of the Federation of British Industries and the National Union of Manufacturers, the conference discussions will be built around a general theme of speeding management decisions.

A NEW FACTORY to produce high-grade carpenters' hammers is now being built at Ecclesfield by Stanley Works (G.B.), Limited, hand-tool manufacturers; the new works will be equipped with the very latest plant and machinery. Since 1948, the company has added two new extensions to the original factory and with the completion of their hammer factory this year, production floor-space will have been multiplied more than four times in under 10 years.

THE UNIVERSAL ASBESTOS MANUFACTURING group announces the formation of Universal Asbestos Manufacturing Plastics, Limited, as a wholly-owned subsidiary of the parent organization. The new company is to make glass-fibre-reinforced plastics materials based on polyester resins; for this purpose rights have been acquired in a new system of manufacture. This plant will be installed in a new building at the Watford works, where construction is already in progress.

A PRESENTATION SCHEME in recognition of long service with the company has been inaugurated by Associated Lead Manufacturers, Limited. The qualifying period is 25 years and of the works and office personnel 289 are eligible. Many of these have passed the 25 year mark and some have completed their half-century. Following well-established precedent, watches will be awarded, according to choice, and presentations are being made in each of the company's three area centres.

DUE TO EXPANSION of work and consequent doubling of the engineering staff since 1954. the eastern area of the National Industrial Fuel Efficiency Service has taken over new premises at 8, Queen Anne Terrace, Cambridge. In under three years the area has more than doubled the number of heat and power surveys undertaken, and since its inception it has been in contact with about 1,200 firms and organizations. Of those trained in the area for the boiler operators' certificate, 92 per cent. were successful compared with the national average of 77.5 per cent.

ISCOR (South African Iron and Steel Industrial Corporation) is in such a strong position that the Minister of Economic Affairs, Dr. van Rhijn, is of the opinion that the time is coming when Iscor will be able to supply the Union of South Africa with all its steel requirements and, what is more, to supply neighbouring territories with an increasing portion of their requirements. The Minister made this announcement on the occasion of a presentation at Pretoria of long-service badges and certificates, and incidentally, he said that Iscor stood as a symbol of the nation's courage and faith.

THE COUNCIL of the British Manufacturers of Petroleum Equipment states that orders for the manufacture of equipment and materials for the oil industry reached a new record total in 1956 at £153,700,000, an increase of 24 per cent. over the total for 1955. The biggest single demands were for tubulars, pipe fittings, and valves, orders for which made £35,700,000 of the total. Orders for specialized drilling and production equipment contributed £15,200,000, tools and machinery £8,700,000, and tankage orders placed amounted to £8,700,000. Chemicals used in the oil industry accounted for a total of £24,600,000.

AS FROM FEBRUARY 1, the business of Autocontrol Boilers, Limited, 167 Temple Chambers, Temple Avenue, London, E.C.4, suppliers of gas-fired boilers for central heating and hot-water supply, has been taken over by Hattersley Brothers Limited, Queen's Foundry, Swinton, Mexborough, Yorkshire. Hattersley Brothers, Limited, have appointed Mr. T. E. Horvell, who has for many years been associated with Autocontrol

News in Brief

Boilers Limited, as general manager of their gas division. The London office of Autocontrol Boilers, Limited, is being closed down, and the staff including Mr. Norvell will move to the office of Hattersley Brothers, Limited, at 184/185 Temple Chambers, Temple Avenue, London, E.C.4.

ADDRESSING the Coventry Chamber of Commerce on February 15, on his re-election as president, Mr. Alick Dick, managing director of the Standard Motor Company, Limited, said it was necessary for industry to re-equip and modernize its plant, to introduce machinery to increase its productivity commonly known as automation. No matter how carefully industry planned the introduction of such machinery there would be times, maybe temporary, when men would find themselves out of work; but a company must instal this new plant in order to compete, for failure to do so could mean, not a few, but all of its employees losing their jobs. When he spoke at the annual banquet of the Coventry Chamber of Commerce earlier this month, Mr. Dick dealt with problems facing industry. These included the need to meet competition from overseas, provision of better incentives for technologists, technicians, and executive staffs, and the encouragement of industrial investment by ensuring adequate return. Referring to the country, and Coventry in particular, as being in danger of becoming uncompetitive, he said markets had been lost because the value given had not been equal to that given by overseas competitors. The results were painful and men had lost their jobs.

Parliamentary

Pneumoconiosis

In a discussion in Parliament regarding pneumoconiosis, MR. DUGDALE, MP for West Bromwich, asked the Minister of Pensions and National Insurance (1) the total number of cases of pneumoconiosis in West Bromwich since July 5, 1948, up to the present time, including those who have died therefrom; (2) the number of foundry workers in West Bromwich who have died since July 5, 1948, who were suffering from pneumoconiosis at the time of their death.

MR. BOYD-CARPENTER, replying, said, "I regret that in neither case is the information asked for by the right hon. Gentleman available."

MR. DUGDALE, "Does the right hon. Gentleman's inability to provide this information not demonstrate the need to have an adequate diagnosis of this disease and in particular to have large-scale X-rays, not only for West Bromwich but for the Black Country, so that the proper diagnosis may be made, and made early."

MR. BOYD-CARPENTER, "No, Sir. The fact that I cannot give the right. hon. Gentleman the figures for which he asks has nothing whatever to do with diagnosis or medical grounds but is due to the fact that the figures for this disease are not kept on a local basis."

MR. DUGDALE asked the Minister of Pensions and National Insurance the number of foundry workers in West Bromwich who are receiving special hardship allowances in addition to disablement benefit in respect of pneumoconiosis.

MR. BOYD-CARPENTER, "I gave the right hon. Member the available information in reply to his Question on December 19, to which Answer I would refer him."

Iron and Steel Trade

With the possible exception of coal, the steel industry is offered greater opportunities than any other of responding to the exhortations of the Chancellor of the Exchequer to expand the volume of exports. There is a big overseas demand for British steel and prices are well above the frozen levels for home sales. But sales of a wide range of iron and steel products are forbidden except under licence.

Pig-iron

With nearly 1,000,000 tons of pig-iron in stock, it cannot be said that the shortage is acute, but the fact remains that there are fewer blast furnaces in operation than there were 12 months ago and the continued imports of foreign iron clearly indicate that the aggregate output still falls short of domestic requirements. Production of foundry and forge iron is almost entirely concentrated in the Midlands—Derbyshire, Leicestershire, Notts, and Northants—and supplies are reasonably satisfactory.

Neither is the supply and consumption of hematite seriously unbalanced, but basic iron production, now averaging over 200,000 tons a week, falls short of the steel industry's requirements and expansion of ingot production awaits the completion and operation of new blast furnaces.

Finished Iron

Despite the fact that makers are concentrating on liquidating their existing obligations as quickly as possible, the demand from consumers and stockholders in the home market is such that production is practically absorbed. Very little tonnage is available for export.

Ferro-alloys

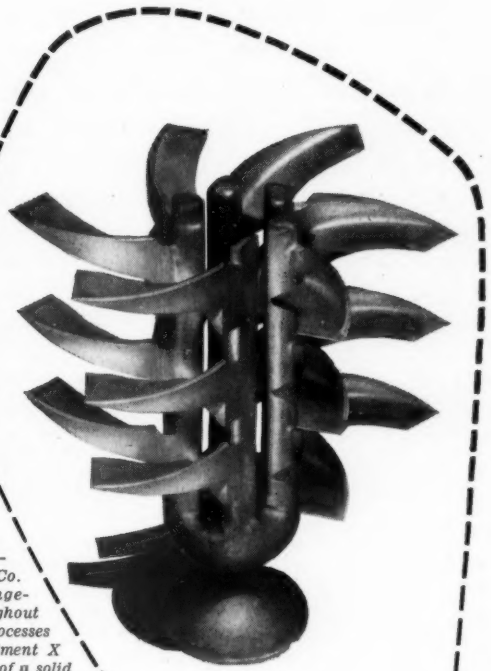
A further decrease in the price of ferro-tungsten is recorded, today's price being 14s. per lb., while tungsten metal powder is now 17s. per lb. Despite the continuing downward trend in the price of ferro-tungsten, there is a fair demand for this item, consumers requiring supplies for immediate use. Ferro-molybdenum is quite well supported and ferro-vanadium is fairly active.

There is a steady demand for ferro-chrome, while ferro-silicon continues to move in interesting tonnages. Ferro-manganese is quite active, and moderate support is forthcoming for supplies of ferro-columbium and ferro-titanium. Silicon metal is quiet, but chromium metal is slightly more active.

Conference of Standards Engineers

The third annual conference of engineers and others with special responsibilities for standards will take place on Thursday, 9th May. This year's meeting will be at Church House, Westminster, enabling many more people to attend, this is due to the success of the two previous gatherings. The conference is being arranged by the British Standards Institution and the Institution of Production Engineers. The conference will provide an opportunity for discussion of the practical application of standards on the factory floor. The agenda will include items on the role of national and company standards; the development of a coding system for British Standards; and international standards work. Application forms for tickets may be obtained from BSI, 2, Park Street, London, W.1. A registration fee of £1. 1s. 0d. (including the cost of a buffet luncheon) will be charged.

Monsanto's SILESTER O makes new Investment X casting process possible



Developed by Metropolitan-Vickers Electrical Co. Ltd., and by arrangement licensed throughout the world by Shaw Processes Limited, this new Investment X process does not make use of a solid mould. A wax pattern of the final casting is prepared and then subjected to a series of "dips" in a thin slurry of Monsanto's Silester O and a suitable filler. The shell is then immersed in a vapour bath of Trichlorethylene which dissolves out the wax, leaving a clean hollow shell ready for firing and then for casting.

ONCE AGAIN Monsanto's Silester O proves itself to be the ideal binder for investment casting. Most recent case in point is the new Investment X Process.

Silester O imparts a strong "green set" to the moulds, speeds the curing cycle and ensures progressive build up of the requisite fired strength. Speed and efficiency of production, and the close control obtainable, bring process advantages that more than pay for its cost.

Advantages of Investment X Process. Little investment material used for larger shapes. Wax recovery complete. Shell moulds more permeable, lighter in handling. Makes precision casting of larger units possible at an economic cost.

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Raw Material Markets

Iron and Steel

Pig-iron production continues to be concentrated mainly on the supply of basic iron to the steelworks. Further expansion in production from furnaces which will be brought into commission later will provide additional tonnages of basic pig-iron for the steelworks. The blast furnaces are well provided with supplies of ore and coke.

In the foundry grades of pig-iron, present outputs more than cover demands, which reflects the present overall reduction in the demand for castings. In the hematite and low-phosphorus irons, the reduced demand is mainly confined to the foundries supplying castings to the motor vehicle trade. While good tonnages continue to be taken up by many other producers of high-duty castings, some furnaces have found it necessary to add to stocks; this they have not done for many years. These stocks are not large, however, and could be cleared quickly if additional export licences were granted. The home market for these grades of pig-iron is fluctuating and the small stocks now available would be disposed of rapidly in the event of a slight increase in demand, with the result that only limited tonnages in the low-phosphorus irons are being released for export, while, so far as can be ascertained, no consignments of hematite are being shipped.

The high-phosphorus irons are also in good supply, although outputs continue on a much reduced scale. Home demands show no appreciable increase. Only moderate calls for castings are being received by the light foundries, but it is hoped that seasonal influence will shortly bring improved demands. The textile foundries are also short of work, but the jobbing and engineering foundries are fairly well employed and continue to take up good tonnages of iron. Any surplus of this grade of pig-iron could also be exported if licences were granted.

The re-rollers are fairly well situated for raw materials, but they could do with considerably more steel in the smaller sizes of billets and special qualities. Their stocks are not so high as they were some months ago, due largely to the lower imports and also to the fact that latterly they have been working through their raw material supplies. Although the requirements of certain home consuming trades have fallen in recent months, the slack has been taken up by exports of small bars and sections. Unfortunately, in many cases these exports are now being curtailed.

Non-ferrous Metals

Non-ferrous metal markets continue dull on both sides of the Atlantic. Accordingly, the price cuts in copper announced at the beginning of this week were not altogether unexpected. The Phelps-Dodge Copper Corporation took the lead in bringing its price into line with that of the custom smelters with a reduction of 2 cents to 32 cents a pound. This caused prices in London to drift to lower levels, a movement accentuated by Kennecott following suit. More than that, the Rhodesian Selection Trust group lowered its fixed price for electrolytic after the market closed on Monday by a further £10 a ton to £240 a ton. This latest cut was approximately £10 a ton below the LME price at the time. The weakening of the price structure on both sides of the Atlantic reflects the current position of production exceeding consumption and it will be interesting to see whether demand will now pick up at the lower levels. One interesting point is that, in the United States, January deliveries of electrolytic copper to consumers outside the country were at record levels, strongly indicating that Germany and Japan have absorbed more copper recently than generally believed, and also suggests that a large portion of Chile's output has probably been sold abroad.

The announcement that stocks of refined tin in LME warehouses fell by 103 tons to 475 tons during the week ended February 16 put the price better in London. In America, the quotation eased on the better feeling about the dock strike, but the price is still well clear of the $1.00 per pound level. The strike at the Butterworth smelter in Malaya continues and some observers feel that this, once settled, will lead to a sharp drop in the price. Meanwhile demand is quietly steady in London and in New York.

There are no new developments to report in lead and the price is holding steady in London around £113 a ton and at 16 cents a pound in New York. Stockpiling is still a major influence in the lead market and the same comment applies to zinc, which is less steady than it has been in recent weeks. However, improving steel orders received by US steel companies may be interpreted as a bullish point. The price is firm at 13½ cents per pound, East St. Louis, for "Prime Western" grade.

Latest Foundry Statistics

According to the Ministry of Supply the output during November, 1956, of aluminium castings was 1,906 tons from sand moulds; 3,286 tons as gravity-die, and 1,369 as pressure-die-castings. During this month the output of magnesium castings was 248 tons.

As reported in the monthly *Bulletin* of the Iron and Steel Board, and the British Iron and Steel Federation, there were 20,600 at work in the steel foundries on December 8; this registers an increase of 110 over the November figure and 70 more than December 1955. The estimated average weekly production of steel castings during December was 5,100 tons; in November it was estimated at 7,300 tons, whilst the December 1955 output was 5,900 tons. From the figures available it would appear that, at an annual production of 333,000 tons, the increased production will be of the order of six per cent.

The British Bureau of Non-Ferrous Foundry Statistics reports that the output of copper-base castings in December was 6,001 tons. The production during 1956 was 77,055 tons as against 72,072 tons in 1955, showing an increase of the order of 7 per cent. over the previous year. The production of pure-copper castings is stated to have increased from 6,450 tons in 1955 to 7,800 in 1956.

Agreement Terminated

The agreement between Electromagnets, Limited, Birmingham, and Albert Smith & Company, Glasgow, is being terminated on March 31, 1957, by mutual consent. Albert Smith & Company find it necessary to concentrate more on their foundry and allied work, while Electromagnets, Limited, are making arrangements to deal with their new lines by direct technical and commercial service from their head office and works in Birmingham. The relationship between the two companies continues to be friendly and Albert Smith & Company will still be available, as merchants, to quote for any electromagnetic apparatus required in Scotland.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

February 20, 1957

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £20 1s. 0d.; Birmingham, £19 13s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £21 18s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £22 2s. 3d.

Scotch Iron.—No. 3 foundry, £23 4s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £24 6s. 6d.; South Zone, £24 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £25 14s. 0d.; South Zone, £25 16s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent. :—N.-E. of England (local iron), £22 17s. 6d.; Scotland (Scotch iron), Zone S. 1, £23 4s. 0d.; Sheffield, £24 4s. 6d.; Birmingham, £24 12s. 0d.; Wales (Welsh iron), £22 17s. 6d.

Basic Pig-iron.—£19 3s. 0d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £50 0s. 0d. to £51 15s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £75 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 28s. 6d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 12s. 3d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £250 0s. 0d.; 38/40 per cent., £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 13s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 16s. 6d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £96 0s.0d. to £96 10s. 0d., basis 60 per cent. Cr, scale 33s. 0d. to 31s. 0d. per unit; over 6 per cent. C, £94 0s. 0d. to £95 10s. 0d., basis 60 per cent. Cr, scale 31s. 0d. per unit; 2 per cent. C,* 2s. 1½d. per lb. Cr; 1 per cent. C,* 2s. 2d. per lb. Cr; 0.15 per cent. C,* 2s. 2½d. per lb. Cr; 0.10 per cent. C,* 2s. 2¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent. Nb + Ta, 22s. 0d. to 23s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £75 0s. 32d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £30 9s. 0d.; tested, 0.08 to 0.25 per cent. C, £31 9s. 0d.; hard (0.41 to 0.60 per cent. C), £32 10s. 6d.; silico-manganese, £41 0s. 0d.; free-cutting, £34 13s. 0d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £38 4s. 6d.; silico-manganese, £41 7s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £36 3s. 6d.; basic, hard, over 0.41 up to 0.60 per cent., C, £37 6s. 0d.; acid, up to 0.25 per cent. C, £40 7s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £39 2s. 0d.; boiler plates (N.-E. Coast), £41 12s. 0d.; floor plates (N.-E. Coast), £40 11s. 0d.; sectional material, N.-E. Coast, £37 11s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested (4-ton lots), £37 18s. 0d.; flats, 5 in. wide and under (4-ton lots), £37 18s. 0d.: hoop and strip, £37 17s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g, £41 6s. 0d.; black sheets (hand mill), 17/20 g., £52 4s. 6d.; galvanized corrugated sheets, 24 g., £65 9s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £64 13s. 9d.; nickel-chrome, £88 15s. 3d.; nickel-chrome-molybdenum, £100 13s. 9d.

NON-FERROUS METALS

Copper.—Cash, £241 10s. 0d. to £242 0s. 0d.; three months, £240 0s. 0d. to £240 10s. 0d.; settlement, £242 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 4½d. per lb.; rods, 278s. 6d. per cwt. basis; 20 s.w.g., 311s. 9d. per cwt.

Tin.—Cash, £767 0s. 0d. to £768 0s. 0d.; three months, £745 0s. 0d. to £746 0s. 0d.; settlement, £768 0s. 0d.

Lead (Refined Pig).—Second half February, £113 0s. 0d. to £113 5s. 0d.; second half May, £112 0s. 0d. to £112 5. 0d.

Zinc.—Second half February, £97 15s. 0d. to £98 0s. 0d.; second half May, £95 15s. 0d. to £96 0s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £132 10s. 0d.; rolled zinc (boiler plates), all English destinations, £130 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £110.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0½d. per lb.; rods, drawn, 2s. 11d.; sheets to 10 w.g., 212s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 212s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £185; B6 (85/15), —; BS249. —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £245; HTB2 (38 tons), £255; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £251; LG3 (86/7/5/2) £262; G1 (88/10/2/½), £314; (88/10/2/1), £307.

Phosphor Bronze.—BS1400, PB1 (AID released), £324 per ton.

Phosphor Bronze Strip, etc.—Strip, 297s. 0d. per cwt.; sheets to 10 w.g., 297s. 0d. per cwt.; wire, 4s. 0½d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars: solids 3s. 4½d., cored 3s. 5½d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £84 10s. 0d. to £84 15s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £272; AB2, £290. Solder, brazing, BS1945, type 8 (50/50), — per lb, type 9 (54/46), — per lb.

* Average 68-70 per cent.

Appleby-Frodingham Output Records

An output of 10,000 tons was achieved by the 42-in. cogging mill at the Scunthorpe works of the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited) recently, the highest output recorded in the company's history. Operating on a 17-shift basis, the charged weight of ingots going through the mill amounted to 10,515 tons, compared with the previous best record of 9,801 tons for 17 shifts in July, 1954. The Queen Mary blast furnace at Scunthorpe, which has been relined and slightly enlarged, also made a new production record recently, with an output of 7,380 tons of iron.

The appointment is announced of Dr. A. M. UTTLEY as superintendent of the control mechanisms and electronics division of the National Physical Laboratory, Teddington (Middx). He will succeed Mr. R. H. TIZARD, who has taken up an appointment at the London School of Economics.

Mr. J. L. MEASE has been appointed an additional assistant superintendent at the Sheffield works of Metropolitan-Vickers Electrical Company, Limited. He joined the company as a college apprentice in 1932 and went to Sheffield as a junior process engineer. After experience in several departments he was appointed head of the production department in 1941, a post he continues to hold. Mr. R. S. HINDS, assistant superintendent since 1949, will continue to be concerned with manufacturing operations.

Wrought Titanium Prices

Substantial reductions in the price of wrought titanium and titanium alloy products are announced by Imperial Chemical Industries, Limited, the largest producer of titanium in the UK. While continuing to vary according to the form of wrought product and the grade or alloy of titanium used, prices will in general be lowered by 10 per cent.

Two factors have contributed to this important development. First, the steadily expanding range of applications for titanium in the aircraft industry, coupled with increasing production efficiency. Second, the continuing decline in the price of ICI raw titanium metal, which for the past year has been below that of equivalent American material. At 19s. 6d. per lb., ICI raw titanium metal is selling at the lowest published price in the world.

World Steel Output Record

World production of steel in 1956, according to the American Iron and Steel Institute, reached a record of 311,000,000 net tons, which compares with the former record of 295,000,000 tons in 1955.

The United States output of 115,000,000 tons was by far the largest of any country in spite of the estimated loss of 11,000,000 tons during the 35-day strike in the middle of the year. The next largest producer, the Soviet Union, had an estimated output of 54,000,000 tons. Next came western Germany with nearly 26,000,000 tons, Great Britain with 23,000,000 tons, France with nearly 15,000,000 tons, and Japan with 12,000,000 tons.

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Personal

Mr. R. F. BROOKER has been appointed general sales manager of Tecalemit, Limited, Plymouth.

Colonel J. P. HUNT has joined the board of Newton, Chambers & Company, Limited, Thorncliffe, Sheffield.

MR. HUGH R. BYERS, special director and sales manager of William Beardmore & Company, Limited, has been appointed a director of the company.

Mr. G. W. HALL, a vice-chairman and managing director of the Fairey Aviation Company, Limited, has been appointed acting chairman following the death of Mr. ROLAND T. OUTEN.

Mr. B. L. SNOW (sales manager) on February 12 joined the board of George Mann & Company, Limited, manufacturers of rotary offset printing machinery.

Mr. H. C. WILSON BENNETTS, director of sales of Allied Ironfounders, Limited, Brook Street, London, W.1, left the country on Wednesday, February 20, for an extended tour of South Africa, the Rhodesias and Kenya.

Mr. LEWIS SMITH, of Samuel Osborn & Company, Limited, has been appointed a member of the Yorkshire Electricity Consultative Council, to represent large industrial consumers. He was nominated by Sheffield Chamber of Commerce.

MR. H. F. CLEMENTS, managing director of William Jacks (Malaya) Limited, will retire at the end of March, and join the board of William Jacks & Company, Limited, in London, MR. A. J. M. RAMSAY has been appointed general manager.

Mr. EDWARD SARA, of the United Steel Companies Limited, has been nominated by the Council of Sheffield Chamber of Commerce for the Free Trade Area Consultative Panel being set up by the Association of British Chambers of Commerce.

Mr. ERIC L. MIDGLEY, chairman and managing director of Midgley, Limited, of Sheffield, sailed for South Africa on February 14. He is visiting South Africa in connection with a supply of ferro-manganese and carbon ferro-chrome to local steel firms, and other firms in the trade.

Mr. and Mrs. J. H. B. NICHOLSON celebrated their golden wedding anniversary last Sunday. Prior to his retirement in 1938, at the age of 60, Mr. Nicholson had been employed at the Woodhouse Works, Brighouse, of J. Blakeborough & Sons, Limited, valve manufacturers.

Mr. WHITNEY W. STRAIGHT and Mr. RONALD H. CRAWFORD have been appointed members of the Council of Industrial Design. Mr. Straight is deputy chairman of Rolls-Royce, Limited, and Mr. Crawford is managing director of Thomas Somerset & Company, Limited, linen manufacturers.

Mr. H. W. DIETERT, chairman of H. W. Dietert Company, Detroit, has been nominated to succeed Mr. Frank W. Shipley as president of the American Foundrymen's Society, and Mr. L. H. Dufdin, president of the Dexie Bronze Company, Birmingham, Alabama, has been nominated vice-president.

Mr. G. R. T. TAYLOR, chairman of International Combustion (Holdings), Limited, was presented with a portrait in oils of himself at a meeting of the board of directors last week. Mr. Taylor has been chairman of the company since its inception in 1934 and he was also chairman of the previous company from April 1, 1925.

Mr. G. ANTHONY HEPWORTH, a director of Hepworth & Grandage, Limited, engineers, Bradford, has been elected to the board of Associated Engineering (Sales), Limited, London, to fill the vacancy created by the death this year of his father, Mr. Elijah Hepworth, former chairman and managing director of the Bradford firm.

The appointment is announced of Mr. RAYMOND RIPLEY as joint managing director, and Mr. HERBERT D. WALKER as a director, of Richard Hill, Limited, iron founders, and Richard Hill Rolling Mills, Limited, of Middlesbrough. Mr. BERNARD A. BROMWICH has retired from the position of joint managing director, but retains his seat on the board of both companies.

Mr. W. W. WATSON, technical director of Herbert Morris, Limited, lifting and transporting machinery manufacturers, of Loughborough (Leics), who recently returned from a tour of Australia and New Zealand, has gone to India with Mr. D. M. LAWSON, the secretary of the company. Mr. HOWARD G. PURNELL, the vice-chairman, is now on a business trip to South Africa.

Mr. HOWARD L. PHILLIPS has been appointed export sales manager and Mr. DONALD R. JOHNSON assistant export sales manager of the Nordberg Manufacturing Company, manufacturers of diesel engines, compression machinery, etc., of Milwaukee, US. Mr. Phillips was formerly the company's assistant export manager, while Mr. Johnson was senior sales engineer of the export division.

Mr. W. R. EDWARDS, M.I.MECH.E., has retired from the position of managing director of John Thompson Water Tube Boilers, Limited, Wolverhampton, after more than 50 years service with the John Thompson group; he is, however, continuing in a consultative capacity. Mr. C. J. HOWARD, who succeeds him, has been with the company for 31 years, the last 20 of which he has operated as London manager and director.

Obituary*

The death occurred suddenly on February 8 of Mr. J. C. CHARLTON, managing director of Andrew Strang & Company, Limited, of Blair Foundry, Hurlford, Ayrshire.

Mr. ROWLAND STATON, a director of Firth-Vickers Stainless Steels, Limited, of Sheffield has recently died. He was a member of the Iron and Steel Institute and a past-president of Sheffield Metallurgical Association. He was also a director of Shepcote Lane Rolling Mills, Limited.

The death has occurred in hospital after a long illness of Mr. JOHN CLARKSON CLOSE, 44-year-old managing director of Whitley Partners, Limited, valve manufacturers and engineers, of Leeds. He studied engineering at Cambridge, and, on the death of his father, took over the managing directorship of the firm in 1932 when he was only 19.

Mr. ALBERT GOOD, a former director of the English Steel Corporation, Limited, and chairman for 25 years of Clifford Motor Components, Limited, Birmingham, has died at the age of 89. Born in Sheffield, Mr. Good joined Charles Cammell & Company, Limited, in 1881, and was commercial director of Cammell Laird & Company, Limited, Sheffield, when it became part of the English Steel Corporation in 1929.

* See also page 232.

The foundry-yard is the graveyard of moulding boxes

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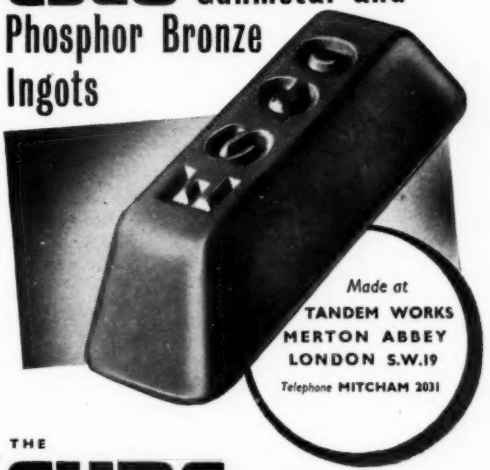

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TANDEM WHITE METALS · TANDEM BEARINGS
ARIEL & ESCO CHILLCAST PHOSPHOR BRONZE RODS

Industrial Derating

As part of the recasting of the financial relationship between the Exchequer and local authorities, the Government has decided to raise the rate contribution of industry and freight transport. Mr. Henry Brooke, Minister of Housing and Local Government, announced in Parliament last week that the rate contributions would be doubled.

In 1929 when unemployment was widespread, he said, it was decided in the light of economic conditions as they then were to derate industry and freight transport from 100 per cent. to 25 per cent. of net annual value. Against the radically different economic background of the present day the Government had thoroughly re-examined the matter, taking into account the arguments in both directions and had decided that it was now right to raise the rate contribution of industry and freight transport.

In addition further changes would be made in the system of pool payments to local authorities by the nationalized industries, including the direct rating of electricity properties and the separate assessment of electricity and gas showrooms used as shops, so that all payments now included in the pool were taken into account as rates. In Scotland the necessity for changes on these lines would not arise during the period up to 1961 for which the existing valuations were frozen.

At the same time the Government intended a major recasting of the financial relationship between the Exchequer and local authorities. It would involve a radical revision of the structure of Exchequer grants as well as some reduction of the grants to take account of the new rate income.

These and other changes affecting local government financial administration would, as far as was practicable, come into operation on a single date.

The Opposition considered the half hog of rerating industry a poor unworkable animal, said Mr. Gilbert Mitchison (Lab.). The only course was to rerate industry in full.

Mr. Brooke replied that it would be better to meet local authorities before crystallizing the Government's precise proposals. He would consider issuing a White Paper.

Board Changes

WELLINGTON TUBE WORKS, LIMITED—Dr. H. C. Rowan has been appointed a director.

HEAD WRIGHTSON IRON FOUNDRIES, LIMITED—Mr. N. Addison has been appointed to the board.

GEO. ADLAM & SONS, LIMITED—Mr. Robert W. Young has been appointed to the post of joint managing director.

WILLIAM BEARDMORE & COMPANY, LIMITED—Mr. Hugh R. Byers, a special director and sales manager, has been appointed a director.

HEAD WRIGHTSON TEESDALE, LIMITED—Mr. R. H. Sturges has been appointed managing director and Mr. R. Purnell a director of the company.

HEAD WRIGHTSON STOCKTON FORGE, LIMITED—Mr. J. W. Wardell has been appointed managing director and Mr. R. B. W. Bolland a director of the company.

ARGUS FOUNDRY, LIMITED—Mr. J. W. Atwell, executive director of G. & J. Weir, Limited, and Mr. F. G. B. Henderson, a director of Drysdale & Company, Limited, and Albion Motors, Limited, have been appointed directors.

Forthcoming Events

FEBRUARY 25

Institution of Works Managers

Glasgow branch:—"Some Uses of Electronic Instruments," by A. D. Parsons, B.SC., 7.30 p.m., at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, C.2.

Institution of Mechanical Engineers

Report of the British delegation, which recently visited the USSR, entitled "Engineering Education in the USSR," 5.30 p.m., at the Institution of Civil Engineers, Great George Street, London, S.W.1.

Austrian Institute

"Recent Developments in Austria in the Field of Metallography," by Prof. R. Mitsche, 6.30 p.m., at 28, Rutland Gate, London, S.W.7.

FEBRUARY 26

Incorporated Plant Engineers

South Wales branch:—"Heating and Ventilating in Modern Works," 7.15 p.m., at the South Wales Engineers' Institute, Park Place, Cardiff.

Institution of Works Managers

Lancaster group:—"Materials and Mechanical Handling," by G. R. Gedye, M.A., PH.D., 7.30 p.m., at the Storey Institute.

FEBRUARY 27

Institute of Metals

All-day informal discussion on "Degreasing," commencing 10.30 a.m., at the University, Edgbaston, Birmingham.

Institute of British Foundrymen

Birmingham branch:—"Sub-surface Blowholes in Grey Cast Iron and their Association with Manganese-Sulphide Segregation," by W. G. Tonks, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

London branch:—"Methods Engineering With Emphasis on the Flow Process Applied to Fettling-shop Control," by F. Gaiger and R. Hancox, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, London, W.C.2.

Manchester Metallurgical Society

"Mechanism of Diffusion," by A. D. Le Claire, B.A., 6.30 p.m., at the Manchester Room, Central Library, Manchester.

Institution of Mechanical Engineers

Yorkshire branch:—"A Criticism of the Technical Education of Recently-qualified Engineers," by P. P. Love, B.SC., 6.30 p.m., at the University, Sheffield.

FEBRUARY 28

Incorporated Plant Engineers

Sheffield and district branch:—"Interpretation of the Clean Air Bill, 7.30 p.m., at the Grand Hotel, Sheffield.

Institution of Production Engineers

Lincoln section:—"Electronic Control," by J. A. Stokes, B.SC., 7.30 p.m., at the Ruston Club.

MARCH 1

Institute of British Foundrymen

Tees-side branch:—"Aluminium-alloy Castings—Production to Specification," by John Vickers. (Details from the secretary.)

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

ALTRINCHAM, February 28—Manhole covers and frames; gully gates and frames, etc., for the year ending March 31, 1958, for the Town Council. The Borough Surveyor, Town Hall, Altrincham (Ches.)

AYLESBURY, March 4—Iron castings (gully grates, weirs, and manhole covers) for the year ending March 31, 1958, for the Buckinghamshire County Council. The County Surveyor, County Offices, Aylesbury.

CHESTER-LE-STREET, February 28—Manhole covers and frames, step irons, etc., for the year ending March 31, 1958, for the Rural District Council. Mr. W. Hughes, surveyor, Union Offices, Chester-le-Street (Co. Durham).

DROITWICH, February 25—Supplying and laying of some 6,300 yds. of 4-in. cast-iron and 2-in. galvanized water mains, etc., for the Rural District Council. The Surveyor, Council Offices, Droitwich. (Deposit £2 2s., returnable.)